Nevada
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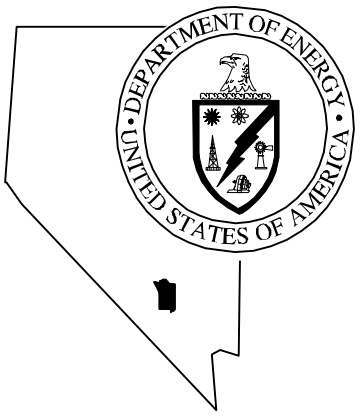

Corrective Action Decision Document for Corrective Action Unit 417: Central Nevada Test Area Surface, Nevada

Appendix D - Corrective Action Investigation Report for Central Nevada Test Area, CAU 417

Controlled Copy No:____
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April 1999

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Environmental Restoration
Division

U.S. Department of Energy
Nevada Operations Office

CORRECTIVE ACTION DECISION DOCUMENT FOR CORRECTIVE ACTION UNIT 417: CENTRAL NEVADA TEST AREA SURFACE, NEVADA

APPENDIX D - CORRECTIVE ACTION INVESTIGATION REPORT FOR CENTRAL NEVADA TEST AREA, CAU 417

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List of Acronyms and Abbreviations

AEC	U.S. Atomic Energy Commission
ASE	Accelerated Solvent Extraction
bgs	Below ground surface
BTEX	Benzene, toluene, ethylbenzene, and toluene
CADD	Corrective Action Decision Document
CAI	Corrective Action Investigation
CAIP	Corrective Action Investigation Plan
CAIR	Corrective Action Investigation Report
CAS	Corrective Action Site(s)
CAU	Corrective Action Unit(s)
CFR	*Code of Federal Regulations*
cm	Centimeter(s)
CMP	Central Mud Pit
CNTA	Central Nevada Test Area
COC	Contaminants of Concern
COPCs	Contaminants of potential concern
DC	Direct Current
DOE	U.S. Department of Energy
DOE/NV	U.S. Department of Energy, Nevada Operations Office
EM	Electromagnetic
EPA	Environmental Protection Agency
ESC	Expedited Site Characterization
FFACO	*Federal Facility Agreement and Consent Order*
FI	Field Instruction
FLAA	Flame Ionization Atomic Absorption
ft	Foot (feet)
gal	Gallon(s)
GC/FID	Gas Chromatography/Flame Ionization Detection
GPS	Global Positioning System
ID	Identification
IDL	Instrument detection limit
IDW	Investigation-derived waste

List of Acronyms and Abbreviations (continued)

in.	Inch(es)
IT	IT Corporation
kg	Kilogram(s)
km	Kilometer(s)
km^2	Square kilometer(s)
L	Liter(s)
m	Meter(s)
m^3	Cubic meter(s)
MDA	Minimum Detectable Activity
mg/kg	Milligram(s) per kilogram
mg/L	Milligram(s) per liter
mi	Mile(s)
mi^2	Square mile(s)
mS/m	MilliSiemens per meter
NA	Not analyzed
NAC	*Nevada Administrative Code*
ND	Not detected
NDEP	Nevada Division of Environmental Protection
NSPC27	Nevada State Plane Central 1927
NTS	Nevada Test Site
ohm-ft	Ohm(s) per foot
PAH	Polycyclic aromatic hydrocarbon(s)
PAL	Preliminary Action Level
pCi/L	Picocurie(s) per liter
pCi/g	Picocurie(s) per gram
PID	Photoionization detector
PPE	Personal protective equipment
ppm	Part(s) per million
PRG	Preliminary Remedial Goal(s)
QA	Quality Assurance
QA/QC	Quality Assurance/Quality Control
QAPP	Quality Assurance Project Plan
QC	Quality Control

List of Acronyms and Abbreviations (continued)

RCRA	*Resource Conservation and Recovery Act*
RDL	Reporting detection limit
RTP	Recording Trailer Park
SVOC	Semivolatile Organic Compound(s)
TC	Toxicity Characteristic
TCLP	Toxicity Characteristics Leaching Procedure
TPH	Total petroleum hydrocarbon(s)
TSD	Treatment, storage, and disposal
TSDF	Treatment, storage, and disposal facility
UST	Underground storage tank(s)
UTM	Universal Transverse Mercator
VOCs	Volatile organic compound(s)
XRF	X-ray fluorescence
yd^3	Cubic yards
μg/L	Microgram(s) per liter

D.1.0 Introduction

This report presents a summary of the field investigations and resulting data collected by IT Corporation (IT), Ames Laboratory, McLaren/Hart Environmental Engineering Corporation, and Technos Incorporated as part of the implementation of the *Corrective Action Investigation Plan for the Central Nevada Test Area CAU 417* (DOE/NV, 1997) and the *Addendum to the Corrective Action Investigation Plan for Central Nevada Test Area, CAU No. 417* (DOE/NV, 1998). The Corrective Action Investigation (CAI) is part of an ongoing U.S. Department of Energy (DOE)-funded project for the investigation of Corrective Action Unit (CAU) 417 for determining the impacts of past weapons testing activities on the surface of the Central Nevada Test Area (CNTA).

The CNTA is located in Hot Creek Valley in Nye County, Nevada, adjacent to U.S. Highway 6 about 15 kilometers (km) (10 miles [mi]) north-northeast of Warm Springs, Nevada (see Figure D.1-1). The CNTA was the location of Project Faultless, which consisted of the detonation of a nuclear device in the subsurface by the U.S. Atomic Energy Commission (AEC) in January 1968. The purpose of this test was to gauge the seismic effects of high-yield subsurface detonations to determine the suitability of the site for future nuclear weapons tests. The yield of the Faultless test was between 200 kilotons and 1 megaton (DOE, 1994b). Two similar tests were planned for the CNTA, but neither was completed (AEC, 1974), however emplacement holes for the intended tests were drilled.

The initial surface investigation of CAU 417 conducted in 1997 included the characterization of surface soils and residual drilling materials for potential contamination resulting from drilling operations. The results of this investigation are provided in Sections D.1.1 through D.6.2.5 of this report. A second phase of investigation activities was conducted in 1998. The results of that investigation are presented in Section D.7.0. The field investigation results and characterization data provided in this report provides the basis for the *Corrective Action Decision Document for the Central Nevada Test Area (CADD)* which provides alternatives for corrective actions for the CAU 417 Corrective Action Sites (CAS). All work on this project was conducted in accordance with the *Federal Facility Agreement and Consent Order* (FFACO) (1996), the *Resource Conservation and Recovery Act*, the *Industrial Sites Quality Assurance Plan (QAPP),*

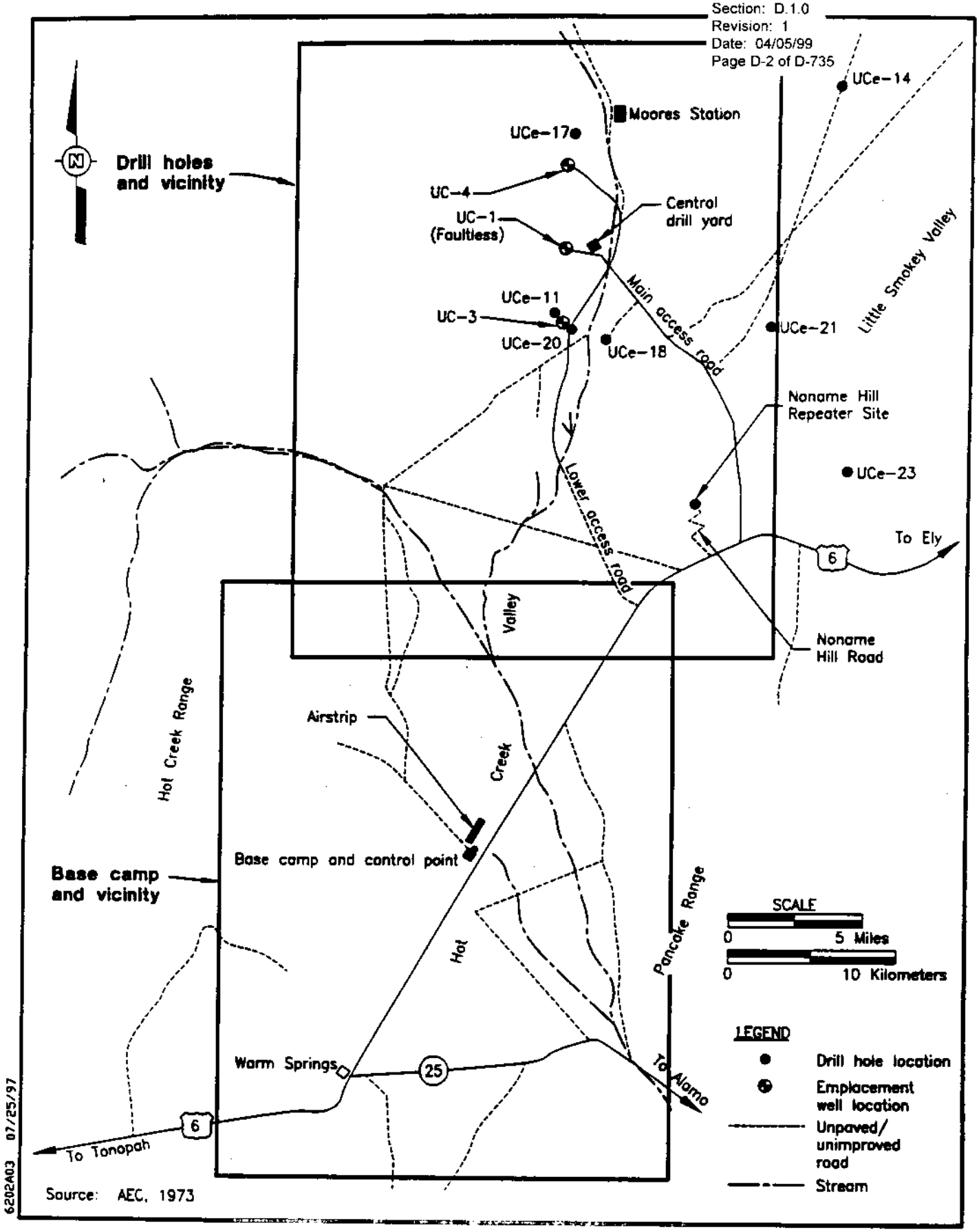


Figure D.1-1
Site Map, Central Nevada Test Area,
Nye County, Nevada

(DOE, 1994a) and all applicable Nevada Division of Environmental Protection (NDEP) policies and regulations (NDEP, 1995).

The 1997 surface investigations were conducted using methods consistent with the principles of an expedited site characterization (ESC). The ESC is a process for characterization of potentially contaminated sites that provides for field based multidisciplinary integration of data resulting from investigation efforts to insure that characterization objectives are met. Elements of the ESC approach used during these investigations included the use of on-site analytical facilities, on-site data management and interpretation, and a flexible work plan incorporating on-site technical staff decision making designed to minimize the potential for subsequent work episodes.

Sections D.1.1 through D.6.2.5 describe the investigation efforts conducted through the CAIP. This investigation was conducted in two phases. Phase 1 work was conducted over a period of 18 working days commencing on September 7, 1996 and completed on September 23, 1996. Phase 2 surface investigations were conducted for a period of 36 working days beginning with mobilization operations on May 5, 1997 and concluding with final demobilization of the site on June 14, 1997. Site operations were suspended for 4 days between May 24, 1997 and May 27, 1997 for the Memorial Day holiday. Forty days were spent on the project site conducting investigation activities. During this period 21 suspected contaminated sites were investigated and characterized. Thirteen of these sites were formerly identified as Corrective Action Sites (CASs) within CAU 417 and the other eight sites were identified as a result of the field activities. There were 1,133 samples collected during the course of the field investigations including quality assurance/quality control samples, waste characterization samples, and mud pit characterization samples as specified in the CAIP and the Field Instructions for Soil Sampling at the CNTA. On-site laboratories received 1,121 samples for analysis of total petroleum hydrocarbons (TPH), total chromium, and hexavalent chromium. Off-site laboratories received 12 samples for analysis of waste characterization parameters. A total of 105 samples submitted to the on-site laboratory were not analyzed based on the results of other samples within these same sites that indicated the analysis of these samples would not further benefit the characterization of the respective site.

D.1.1 Purpose

The purpose of this field investigation was to characterize 13 identified CASs associated with the drilling and completion of wells related to underground nuclear testing on the project site. The CASs investigated were related to the residual drilling fluids and solids remaining from

recirculating drilling fluids in mud pits and the solid separation/shaker systems and the solid debris remaining from well drilling.

Contaminates of concern (COC) for the surface investigations included TPH, both diesel and motor oil range hydrocarbons, and hexavalent chromium. The CASs and other identified sites, including mud pits and shaker debris areas, were investigated to determine COCs were present, to determine the vertical and horizontal extent of the individual mud pits, and to define the nature and extent of any contamination associated with these areas. In addition to chemical/ hydrocarbon contamination, a potential for radioactive contamination was recognized in CASs within the UC-1 area of investigation. The UC-1 CASs were related and proximal to the detonation site of the Faultless subsurface nuclear device. Radiologic screening surveys were conducted on all soil samples collected from any CASs investigated within the CNTA to determine if radiologic contamination existed within the respective areas. In addition to radiologic screening, waste characterization samples were collected from mud pit CASs that were determined to have the greatest concentrations of COCs as determined by on-site analysis. These samples were submitted to Lockheed Analytical Services, an off-site laboratory, for waste characterization analysis which included chemical and radiological parameters.

D.1.2 Scope of Work

Investigation activities were executed using an ESC approach conducted by multiple contractors including: Ames Laboratory, McLaren/Hart Environmental Engineering Corporation, Technos Incorporated, and IT Corporation. These individual contractors provided various services to the project in addition to technical input to the direction of the investigation of the CASs. IT Corporation provided the site infrastructure, overall site management/administration, and was responsible for the collection, handling, and submittal of soil samples to the on-site laboratory facilities. IT Corporation was also responsible for the appropriate handling and disposal of investigation-derived wastes generated over the course of the project. Ames Laboratory provided technical direction on ESC techniques in addition to providing field direction of soil boring and sampling operations. McLaren/Hart provided soil boring and sampling equipment and staff as well as on-site analytical services. Technos was responsible for establishing site grids, surveying, and all surface and subsurface geophysical measurements. All work was conducted in accordance with the NDEP-approved CAIP (DOE/NV, 1997).

The scope of the CNTA corrective action investigation included the characterization of 15 CASs, principally as mud pits and shaker debris areas included in CAU 417. These CASs were located

in four general areas (Central Mud Pit [CMP], UC-1, UC-3, and UC-4) based on the locations of past CNTA well drilling operations. The identified CASs, their locations, and actions to be taken are listed in Table D.1-1. Two of the 15 CASs planned to be investigated were not done. The burn area west of the CMP (CAS 58-35-01) was not investigated because it was determined to be the same as the Decon Facility Pit (CAS 58-07-01) which was not planned for investigation during this effort. The Scrap and Trash Dump west of the UC-3 recording trailer park (CAS 58-19-01) was not investigated because it was never located in the field. Five previously identified CASs were located but not investigated as specified in the CAIP. These CASs are housekeeping sites and will be addressed at a later time. In addition to the listed CASs, several other sites were identified during the course of the investigation and were sampled as appropriate. Table D.1-2 lists sites not designated as CASs at the beginning of the field effort. These sites have since been added to the list of CASs and been assigned CAS numbers.

Table D.1-1
Summary of Corrective Action Sites at the Start of Field Work

Corrective Action Site (CAS)	General Site Notation	Description	Location	Level of Investigation
Section 2.0 Central Mud Pit				
58-09-01	CMP	Central Mud Pit	East of UC-1	Locate, map and sample
58-98-03	N/A	Waste pile (drums, filters, debris)	Adjacent to 1A (58-09-02)	Locate, no investigation
58-07-01	N/A	Decon Facility Pit	West of CMP (58-09-01)	Locate, no investigation
58-35-01	N/A	Burn area	West of CMP (58-09-01)	Locate, no investigation
Section 3.0 UC-1 Well Area				
58-09-02	U1A	Mud Pit 1A	Southwest of CMP (58-09-01)	Locate, map and sample
58-09-04	U1B	Mud Pit/Borrow Area 1B	UC-1 (HTH-1 Well)	Locate, map and sample
58-09-05	U1C, U1D, U1E	Mud Pits (3) 1C, 1D and 1E	UC-1 Surface GZ	Locate, map and sample
58-44-02	U1X	Drilling mud/grout piles (2)	Southeast of UC-1	Locate, map and sample
58-44-01	U1X	Drilling mud/grout piles (2)	West of CMP (58-09-01)	Locate, map and sample
Section 4.0 UC-4 Well Area				
58-09-03	U4A, U4B, U4C, U4D, U4E	Mud Pits (5) 4A, 4B, 4C, 4D and 4E	UC-4	Locate, map and sample
58-10-02	U4S	Shaker Pad Area	North of UC-4	Locate, map and sample
Section 5.0 UC-3 Well Area				
58-09-06	U3A, U3B, U3C, U3D, U3E	Mud Pits (5) 3A, 3B, 3C, 3D and 3E	UC-3	Locate, map and sample
58-10-01	U3S	Shaker Pad Area	Northeast of UC-3	Locate, map and sample
58-99-01	U3U	Protruding pipes (2), Possible underground storage tank	Southeast of UC-3	Locate, map and sample
58-44-03	U3Z	Drilling mud/grout spill area	Southeast of UC-3	Locate, map and sample
58-44-04	U3Y	Drilling mud/grout spill area	Southwest of UC-3	Locate, map and sample
58-19-01	N/A	Scrap and trash dump	West of UC-3 RTP	Locate, no investigation
58-98-01	N/A	Waste pile (drums, filters, debris)	West of 3A (58-09-06)	Locate, no investigation
58-98-02	N/A	Waste pile (drums, filters, debris)	South of UC-3	Locate, no investigation
58-98-04	N/A	Waste pile (metal, cables, debris)	Adjacent to (58-44-03)	Locate, no investigation

Table D.1-2
Summary of New Sites Investigated

Corrective Action Site (CAS)	General Site Notation	Site Description/Methods of Identification	General Location	Level of Investigation
58-44-06	U1Y	Unknown depression identified during aerial photo and field inspection in Phase 2.	About 3,600 ft south of UC-1 at the Recording Trailer Park	Located and sampled
58-44-05	U1X	Two grout piles identified from aerial and field inspection in Phase 1A.	About 250 - 400 ft northeast of UC-1	Located, mapped, and sampled as with other grout piles
58-10-03	U1S	Shaker pad area/drill cuttings dump: Identified during field inspection in Phase 1A.	UC-1 between Mud Pits 1C and 1D/1E	Located, mapped, and sampled
58-10-06	U3X	Drilling mud/cuttings dump area identified from field inspection in Phase 1A.	North of UC-3	Located, mapped, and sampled as with other similar dump areas
58-05-04	NA	Vertical pipes identified during site visit/field inspection (Feb 97) with NDEP.	West of UC-4	Located, mapped, geophysical survey
58-10-05	U4X	Eastern drainage with shaker pad waste: Identified during field inspection in Phase 1A	East of UC-4	Located, mapped, and sampled
58-10-04	U4W	Southern drainage with shaker pad waste: Identified during field inspection in Phase 1A	South of UC-4	Located, mapped, and sampled
Not assigned	U4Y	Geophysical anomaly identified in Phase 1B	East of UC-4	Located, mapped, and sampled
58-25-01	U3E	Southern Outlier of UC-3 Mud Pit E: Identified during characterization of UC-3 Mud Pit E	South and southeast of UC-3 Mud Pit E	Located, mapped, and sampled

The COCs (associated with the drilling muds used at the various CNTA sites) were hexavalent chromium and total petroleum hydrocarbons. Chromium III was also present but it was not considered a COC. While these chemicals cannot be directly detected using noninvasive and minimally invasive geophysical techniques, their associated drilling muds can be directly detected. The electrical conductivity of the drilling muds (high electrical conductivity due to bentonite) was used as an indicator parameter for geophysically detecting the COCs. This was the basis of the field approach for Phase 1A and 1B.

A multiple phase approach was initiated to investigate and characterize areas of potential COCs. The first phase, Phase 1, was subdivided into two separate episodes, Phase 1A and Phase 1B. The objective of Phase 1A and 1B was to identify the boundaries of mud pits and other uncontrolled waste areas. Surface electromagnetics (non-invasive) and Geoprobe™ conductivity (minimally invasive) techniques were used to map the lateral and vertical extent of high conductivities possibly due to bentonite associated with drilling muds. This information was used to guide the selection of sampling locations and depths in Phase 2. At the beginning of Phase 2, the corners or selected boundary points for each pit were marked in the field based upon the integration of historical aerial photos, surface geophysical surveys, and field observations.

Initial sampling of individual CASs was conducted as specified in the CAIP. This required, for the purpose of statistical analysis, that a minimum of six locations be sampled within each mud pit. The six sampling locations were evenly distributed within each pit and the depth of sampling was to include 0.61-meter (m) (2-foot [ft]) intervals within the mud, one 0.61-m (2-ft) interval above the mud (if the mud was buried) and one 0.61-m (2-ft) interval below the mud. Appropriate depth intervals were determined by Geoprobe™ conductivity profiles and/or visual inspection of the soil materials as they were being acquired. If no muds were detected by Geoprobe™ conductivity profiles or by visual inspection at a given mud pit, then sampling would be continuous up to a depth of 3.05 m (10 ft).

Where areas of uncontrolled wastes were investigated (e.g., shaker pad debris, grout piles), boundaries were identified by the ESC core team using visual inspection supplemented by surface geophysics to assess muds not visible at the surface. Sampling locations were selected based upon the surface geophysics, preexisting information, and/or observations in the field. For these uncontrolled waste areas, the minimum number of sampling locations was selected based on the size and characteristics of the area. Because most of these features appeared to be surface deposits, the depth of sampling was typically very shallow (average 1.83 - 2.44 m [6 - 8 ft] deep)

based upon either Geoprobe™ conductivity profiles and/or visual inspection of the soil materials as they were being acquired.

Once sampling and analysis was completed, three key criteria were used to assess the adequacy of the data. These criteria were:

- Statistical analysis of samples from a given depth inside source areas (mud pits and shaker pads). This evaluation determined whether sufficient samples had been acquired at a single depth interval to provide greater than 90 percent confidence in the determination of the level of contamination in the layer relative to the preliminary action level (PAL).

- Determination of whether the contaminant concentrations from the deepest sample were below PALs. If the deepest samples were above the action level, deeper samples were obtained.

- Confirmation that lateral migration of contaminated material had not occurred in the subsurface

These criteria had to be met before sampling was considered complete for a given CAS or other area of investigation.

A comprehensive investigation was implemented with the ESC methods, using the aforementioned multi-phased approach to the execution of the investigative work.

D.1.2.1 Expedited Site Characterization

Expedited Site Characterization is a process for characterizing contaminated sites which provides timely, high-quality information derived primarily from judgment-based sampling and measurements within the framework of a flexible work plan. The ESC process focuses on collecting only information required to meet defined characterization objectives and on ensuring that characterization ceases as soon as the objectives are met. The process is carried out by an integrated, multidisciplinary project team in a limited number of field mobilizations. The ESC process operates within the framework of existing regulatory programs.

One of the key concepts of the ESC process is the active role of technical personnel in the field. The ESC core technical team for CNTA was comprised of advanced technical staff from all contractors involved in the project. These individuals provided a broad expertise in the

geosciences and contaminant chemistry. The core team provides a solid technical base from which decisions in the field can be made with confidence.

At CNTA, the core team continually reviewed and interpreted chemical and physical data as it became available and communicated this information to field and laboratory crews. The group applied this information to direct field measurements via field instructions to field staff as the work progressed.

D.1.2.2 Phase 1 Work Scope

Work conducted as part of the Phase 1 investigations was performed by Ames Laboratory and Technos Incorporated, with the assistance of IT. Phase 1 investigations were divided into Phase 1A and Phase 1B efforts. The scope of the work was similar; however, it was separated in the time of execution due to health and safety training requirements necessary to conduct work in the area of UC-1.

Phase 1A and 1B focused on the shallow subsurface investigation of four sites at the CNTA that included UC-1, CMP, UC-3, and UC-4 areas. Noninvasive surface geophysical methods along with Geoprobe™ profile technology were used to define the lateral and vertical boundaries of CASs that include mud pits, shaker pads and shaker pad debris, metallic debris, and vertical pipes. The following summarizes the field methods used during the Phase 1 site investigations.

D.1.2.2.1 Land Survey of Investigation Areas

A systematic land survey was conducted by Technos over each of the areas of investigation. A reference grid was established at each of the four areas (UC-1, CMP, UC-3, and UC-4) and marked by surveyor pin flags. Pin flags were placed on the reference grid every 12.19 m (40 ft) in the easting and northing directions and were labeled with their coordinates. The origin is in the southwest corner of each grid. Local grid coordinates were translated into Universal Transverse Mercator (UTM) coordinates during field operations for compatibility with existing DOE databases. Some CASs and other areas investigated lie outside of the main survey grids. These are referred to as “outliers”, and their locations are tied to the closest site grid.

Geographic coordinates for corner points of the reference grids were established using differential global positioning system (GPS). The GPS coordinates were also obtained at areas outside of the survey grid. A more detailed description of the GPS procedures and the geographic coordinates are included in Attachment A.

Surface elevations for the grids were acquired with a digital level. The elevation data were sampled at each of the 12.19 m (40 ft) grid nodes, except where flat terrain allowed for greater sample spacing. Additional elevations were acquired at major slope breaks and were used to create an elevation map for each of the four sites. Interpolated elevations were taken from the computer-generated elevation grid files for each of the Geoprobe™ conductivity profiles and chemical sampling locations. Attachment B contains a detailed description of the field procedures used to acquire the elevation data and presents a tabular listing of the elevations for each site.

D.1.2.2.2 Geophysical Surveys

The geophysical techniques used during this investigation to locate areas of potential contamination are described below.

Electromagnetic (EM) measurements provide a means of measuring subsurface electrical conductivity which, at this site, is a function of moisture, clay content, and bentonite. The EM31 electromagnetic measurements provide a means to map lateral variations in subsurface electrical conductivity to a depth of approximately 6.10 m (20 ft). This was the primary tool used to map the lateral boundaries of the mud pits. These EM31 measurements also provide in-phase data, which defines lateral boundaries of metallic objects. The digital data were acquired continuously along parallel profile lines spaced 6.10 m (20 ft) apart, and EM31 measurements were made at all four sites.

The EM38 electromagnetic measurements provide a means to map lateral variations in subsurface electrical conductivity to a depth of approximately 1.52 m (5 ft). The digital data were acquired continuously along parallel profile lines within the CMP and along selected lines at UC-3 and UC-4. Attachment C contains a detailed description of the field procedures, processing, and results. In addition, this Attachment documents quality control (QC) procedures and resulting data.

The Direct Current (DC) Resistivity soundings provide a means of obtaining vertical stratification information due to changes in electrical resistivity. The soundings produce apparent resistivity values as a function of depth which are related to the electrical properties of subsurface materials. Three resistivity soundings were acquired within the CMP to estimate the vertical extent of the mud. Attachment D contains a detailed description of the field procedures, processing, and results.

A magnetometer and a metal detector pipe locator were used at the various sites to aid in detecting the presence of potential buried tanks and to map pipelines. These instruments were used in support of the EM31 measurements at selected sites. Both instruments were used in a sweeping search mode over localized areas of interest. Data were recorded in a field notebook or field map with the coordinates of areas showing a response.

A Geoprobe™ system with Wenner and "button" dipole conductivity probes was used to obtain vertical electrical conductivity profiles at all four sites using minimally invasive push technology. The purpose of the Geoprobe™ conductivity profiles was to identify the vertical details and vertical extent of the higher conductivity muds. Attachment E contains a detailed description of the field procedures, processing, and a tabular summary of data acquired. In addition, this Attachment contains plots of all Geoprobe™ conductivity profiles.

D.1.2.3 Phase 2 Work Scope

Work conducted as part of Phase 2 was performed by IT, Ames Laboratory, Technos Incorporated, and McLaren/Hart as part of an ESC. Direct chemical evidence regarding the presence and extent of contaminates of concern within the CASs was obtained from soil samples collected from the surface and shallow subsurface soil borings. Sampling was conducted within the respective CASs and other sites based on evidence obtained from the Phase 1A and Phase 1B geophysical surveys. A total of 203 soil borings were completed to depths ranging from 0.61 m - 5.49 m (2 ft - 18 ft). Borings were advanced using Geoprobe™ direct-push sampling equipment. Soil samples were collected as continuous cores at 0.61-m (2-ft) intervals. Soils and drilling materials collected over the respective 0.61-m (2-ft) intervals was homogenized/blended in the field and containerized for submittal to on- and off-site laboratory facilities.

D.1.2.3.1 Analytical Laboratory

A field-based analytical laboratory provided analysis of soil and associated quality assurance/quality control (QA/QC) samples for COC (TPH diesel, TPH motor oil, and chromium as both trivalent and hexavalent species). The preliminary action levels (PALs) for TPH and chromium established in the CAIP (Section 3.4.3.3) are as follows:

- TPH - 100 milligrams per kilogram (mg/kg), which is the regulatory action level for TPH
- Hexavalent Chromium - 390 mg/kg. This PAL was developed from U.S. Environmental Protection Agency (EPA) guidance (EPA, 1996a) and was selected in accordance with NDEP.
- Trivalent Chromium - No PAL Specified in CAIP

Sample extraction for TPH analysis was performed using EPA Method 3545, Accelerated Solvent Extraction (ASE) (EPA, 1996c). This extraction procedure used elevated temperatures and pressures to achieve analyte recoveries equivalent to those from soxhlet and sonication extraction in significantly less time and with smaller quantities of solvent. The TPH analysis was conducted according to modified EPA Method 8015 (gas chromatography with flame ionization detection [GC/FID]) (EPA, 1996c).

X-ray fluorescence (XRF) was employed as the primary method of total chromium analysis due to the relative ease of sample preparation and speed of the analysis. The correlation between XRF results and Flame Ionization Atomic Absorption (FLAA) results was documented by the ESC team while characterization work proceeded in the field (see Chromium Analysis section below).

The primary method for total chromium analysis was by XRF spectrometry. Samples were prepared by mechanical grinding, drying, and sieving. Following the correlation study, approximately 5 percent of the samples were analyzed in parallel by EPA Method 7191 FLAA spectrometry (EPA, 1996c). Sample preparation for FLAA analysis was by microwave digestion (EPA Method 3051) (EPA, 1996c).

Hexavalent chromium sample preparation was conducted using alkaline digestion by EPA Method 3060A and analysis was performed by EPA Method 7196A (visible light spectrophotometry) (EPA, 1996c).

Due to the undefined PAL for total chromium, hexavalent chromium was the species of primary concern. In accordance with the CAIP, chromium analysis was conducted by first determining total chromium using XRF and FLAA spectrometry. If the total chromium concentration was determined to be above the action level for hexavalent chromium, then that sample was also analyzed for hexavalent chromium.

D.1.2.3.2 Chromium Analysis Correlation Study

A correlation study as defined in the CAIP was conducted to determine the statistical correlation of the analysis of total chromium using FLAA and XRF methods of analysis. All soil samples from the first set of locations at the CMP and UC-4 were split and separately analyzed by FLAA

and XRF for total chromium. A minimum of 24 samples was specified in the CAIP to be included in the correlation study. The purpose of these measurements was to test whether the correlation coefficient between these two data sets was equal to or higher than 0.95, so that the faster and cheaper XRF method of analysis could be used to measure total chromium. If sufficient correlation was found, the FLAA would be used for only 5 percent of the samples to ensure that the results continued to correlate.

D.1.2.3.3 Statistical Layer Analysis

A statistical approach, as defined in the CAIP, was used to determine which depth intervals or layers inside individual mud pits and shaker pad areas were above the action level at the 90 percent confidence level for either total TPH or hexavalent chromium. In general, six locations inside each mud pit were selected for sampling at 0.61-m (2-ft) depth intervals.

The statistical test described in detail in the CAIP gave two results: "n_d" the minimum number of samples required to make a statistically valid decision, and "A," the amount by which a given layer was above or below the PAL. This took into account the mean and the standard deviation of the measurements in the layer and the false positive/false negative rates allowed. The values used in the TPH test were total TPH (diesel + motor oil). The values used in the chromium test were hexavalent chromium, if available. If a hexavalent chromium value was not available, the total chromium value was used as a "worst case scenario" for hexavalent chromium. If both XRF and FLAA values for total chromium were available for a given sample, the higher of the two was used.

D.1.2.3.4 Sample Collection

Samples were collected using two types of core samplers. Generally the core samplers were 0.61 m (2 ft) in length with a sampling tube opening of 2.54 centimeters (cm) (1 inch [in.]). However, during conditions of poor recovery, a 1.22 m (4 ft) long core sampler with an internal diameter of 5.08 cm (2 in.) was used to improve sample volume. Soil samples were collected in clear acetate sleeves located within the core sampler. As the sampler was advanced into the soil/drilling materials, these materials filled the acetate sleeve over the interval to be sampled. Upon removal of the sampler from the boring, the outside of the sample barrel was screened for radioactivity, the acetate sleeve was then extracted, opened and the soil radiologically surveyed by IT personnel. The contents of the sleeve were then inspected, and the physical features of the soil/drilling materials were described and logged in detail by the IT geologist. Upon completion of the visual observations of the soils, the contents of the sleeves were composited/homogenized

over the 0.61-m (2-ft) interval. The composited soils/drilling materials were then placed in labeled sample containers. Sample containers were then stored on ice within coolers until transported for on- or off-site analysis. All samples were collected and handled in accordance with ITLV Standard Quality Practices (IT, 1993, as amended).

A composite sample was collected from each 0.61-m (2-ft) interval. In order to obtain adequate sample volume, it was occasionally necessary to advance more than one boring at an individual location. These additional borings were located within 0.31 m (1 ft) of the initial boring. The two samples were then mixed to produce one homogenous sample.

Waste Management and Mud Pit CAS characterization samples were also obtained as specified in the CAIP (DOE/NV, 1997) and CNTA Field Instructions (IT, 1997a). Samples were collected from borings near those that were shown to contain COCs well in exceedence of PALs. A total of 12 soil borings were advanced, resulting in the collection of 13 soil samples, including a duplicate for QA/QC purposes. Four areas of investigation were characterized for waste: CMP, UC-1, UC-4, and UC-3. Waste characterization and mud pit characterization samples were submitted to off-site laboratory facilities for analysis. These samples were analyzed for gross alpha, gross beta, tritium, Toxicity Characteristic Leaching Procedure (TCLP) metals, gamma spectroscopy, TPH diesel, TCLP semivolatile organic compounds (SVOCs), and TCLP volatiles. All samples were accompanied by the statistically appropriate number of field QA/QC samples including field duplicates, field blanks, trip blanks, and equipment decontamination rinsate samples in addition to internal laboratory QA/QC samples. These samples provided information to further characterize the individual CASs for purposes of waste management and to aid in the determination of potential remedial options.

Statistical analysis was performed on the results of samples collected within discrete 0.61-m (2-ft) depth intervals within the mud pit as specified in the CAIP (Section 3.4.6.1). The statistical calculation provided mathematical guidance to demonstrate that an adequate number of samples was collected from an individual 0.61-m (2-ft) layer. An individual layer was considered sufficiently characterized based on the mean concentrations and the standard deviation of that COC. Determinations as to the adequacy of sampling and characterization of the 0.61-m (2-ft) layer were based on a 90 percent confidence level.

D.1.2.3.5 Radiological Monitoring

The Central Nevada Test Area was decommissioned in 1973 and demobilized. Radiological surveys performed in 1973 and 1986 did not detect radioactive contamination on the site surface (AEC, 1974 and REECo, 1986). Since a nuclear device was detonated in the subsurface of UC-1, there is a possibility that fission products may be present. All soil samples collected during the May to June 1997 sampling event were radiologically screened. Radiological screening was conducted in accordance with the Corrective Action Investigation Plan (CAIP), (DOE/NV, 1997) Site Specific Health and Safety Plan (IT, 1997b), and appropriate IT Standard Quality Procedures (IT, 1993 as amended). Radiological screening instruments were checked against sources and background activity was calculated each day prior to beginning field activities. The Preliminary Action Level was set at two times the average measured background level.

A Ludlum Measurements Inc. Model 3™, and Model 19 Micro-R™ meter were used to measure gross gamma radiation. A NE Technology Electra™ was used to measure gross alpha and gross beta radiation.

None of the samples exceeded two times the measured background level.

D.1.3 Summary of Results

Twenty-one suspected sites were sampled for COCs and characterized as a result of planned work efforts under Phase 1 and Phase 2. One site was mapped and geophysical surveys were run but no samples were collected. Of the 21 sites sampled, 13 were CASs addressed in the CAIP and 8 sites were identified as a result of the geophysical surveys or due to their proximity to known areas of contamination. In some cases, the lateral extent of contamination for a known CAS suggested that further investigation outside that area was prudent. Table D.1-1 provides a summary of the existing CASs identified in the CAIP. Table D.1-2 provides a summary of the new CASs identified and investigated during this investigation.

All of the collected and analyzed samples from the respective sites of investigation indicted that only TPH diesel/motor oil was in excess of preliminary action limits as defined in the CAIP. No radionuclide activities were found at any of the sites which exceeded the PALs.

D.1.3.1 Analytical Laboratory Summary of Results

The following sections provide a summary of the analytical results from samples collected as part of surface investigations at CNTA.

D.1.3.1.1 TPH Analysis

Diesel fuel was initially believed to be the only petroleum hydrocarbon contaminant at the site. However, during the first day of sample collection and analysis, a second set of petroleum peaks was observed in the chromatographs by the laboratory analysts. The second contaminant was interpreted to be motor oil. A determination was made by the core team in the field that all subsequent TPH analysis would include motor oil. Standards were acquired and calibrations to TPH were established. The sum of the diesel and motor oil TPH analyses was used for comparison to the PAL and in statistical evaluations. Analytical results for samples collected for on-site analysis are presented in Attachment F. Results for samples submitted for off-site analysis are presented in Section 6.0.

D.1.3.1.2 Chromium Analysis

Hexavalent chromium was present in a portion of the samples at low concentrations, yet did not exceed the PAL of 390 mg/kg. The highest value measured was 64.7 mg/kg, and most were below 20 mg/kg. Analytical results for samples collected for on-site analysis are presented in Attachment F.

D.1.3.2 Chromium Correlation Study Results

A study was performed on the chromium results for soil samples from the CMP and several samples were obtained from the UC-4 well area mud pits to determine the correlation between the concentration of total chromium using XRF methods of analysis verses the results of total chromium using FLAA methods. A high correlation would reduce the number of samples requiring analysis for hexavalent chromium and would provide an estimate for hexavalent chromium concentrations based on results for total chromium determined by XRF methods. The correlation study resulted in an acceptable correlation coefficient of 0.987. The optimal correlation coefficient, as specified within Attachment C of the CAIP, was defined as greater than 0.95.

A minimum of 24 samples were to be included in the correlation study as required by the CAIP. Twenty-seven soil samples were included in this study. The CMP was the first area sampled. Because of shallow refusals in the CMP, only 20 soil samples were available. An additional

seven samples were taken from Pits 4A, 4B, and 4E to form the first batch of samples for the correlation study.

Using EXCEL 7 for Windows 95 statistical analysis software, the correlation coefficient, slope, slope error, intercept along XRF axis, and intercept error were calculated. From this analysis, it was demonstrated that the XRF data is higher than the FLAA data for XRF values below approximately 100 mg/kg and above 200 mg/kg. The correlation coefficient for this data set is 0.987. This result allowed for the use of the XRF as the primary method for total chromium analysis. Data pertaining to the calculation and results of the chromium correlation study are presented in Attachment G.

The correlation coefficient was reevaluated whenever a new batch of paired FLAA/XRF data became available. The coefficient never dropped below 0.978. Sixty-nine pairs were taken during the investigation. The final correlation coefficient was 0.9782.

The CAIP was written so that any sample with a value of total chromium above 300 mg/kg would also be analyzed for hexavalent chromium. This cutoff value was chosen so that if all of the chromium was hexavalent, any value close to, but still below the 390 mg/kg PAL would be measured by the definitive hexavalent chromium method. The results of chromium analysis indicated the percentage of hexavalent chromium in the total chromium of the sample was always less than 3 percent. The data indicated that for XRF values below about 1,500 mg/kg, the hexavalent chromium measurements were nondetects. A Record of Technical Change was submitted by Department of Energy/Nevada Operations (DOE/NV) and approved by NDEP which modified the CAIP to indicate that measurements of total chromium below 1,200 mg/kg would not always be followed by a hexavalent chromium measurement.

D.1.3.3 Statistical Layer Analysis

A statistical approach, as defined in the CAIP, was used to determine which depth intervals or layers inside individual mud pits and shaker pad areas were above the action level at the 90 percent confidence level for either total TPH or hexavalent chromium. In general, six locations inside each mud pit were selected for sampling at 0.61-m (2-ft) depth intervals.

If n_d was less than or equal to the actual number of samples measured for the given layer, then a statistically valid decision as to whether a layer was above or below the PAL could be made.

The irregular or unknown shape and slope of the shaker pad areas made application of the statistical test problematic. The shaker pad at UC-1 was assumed to be directly south of the UC-1 emplacement hole, although no historical documents confirm this. The suspected area also exhibits a steep slope. The shaker pad area at UC-3 is not visible at the surface and was filled and graded prior to demobilization of drilling operations in the late 1960s. The shaker pad area at UC-4 is visible, but is comprised of several tiers of pooled runoff shaker debris in a ravine.

In practice, contaminated layers often had high "n_d" values even after six samples were analyzed. In such cases, the affected layer was declared to be above the action level. Rarely was the "A" value such that additional sampling was indicated.

D.1.3.4 Material Volume Estimates for Areas of Contamination

Within the general areas (CMP, UC-1, UC-4, and UC-3), fourteen of the investigated sites were determined to contain soils and or drilling-related materials with contaminant concentrations above the action levels. The following sites were statistically or judgmentally determined to have total TPH diesel/motor oil in excess of the action limits within discrete 0.61-m (2-ft) layers below ground surface. Estimates are provided in the following sections for the volume of materials affected by TPH contamination within each of the sites. Estimates of the volume of material in excess of the PAL are approximate and were calculated based on a rectangular area that covered the areas of identified contamination extending to the depths of identified contamination. The precise boundary of contaminated materials was not determined during the investigation. The rectangular area used for the purposes of calculating material volumes was based on conservative approximations of the limits of contamination relative to areas of identified uncontaminated materials.

D.1.3.4.1 UC-4 Well Area

The following table provides volume estimates for soils determined to be in excess of the PAL for TPH within the UC-4 area.

Corrective Action Site (CAS)	General Site Notation	Description	Estimated Volume (m^3)		Within the Interval (m)	
58-09-03	U4A	Mud Pit A	2,175.9	(2,844 yd^3)	1.22 - 3.05	(4 - 10 ft)
58-09-03	U4B	Mud Pit B	725.3	(948 yd^3)	1.83 - 2.44	(6 - 8 ft)
58-09-03	U4C	Mud Pit C	1,359.9	(1,778 yd^3)	0 - 1.22	(0 - 4 ft)
58-09-03	U4D	Mud Pit D	2,447.6	(3,200 yd^3)	1.22 - 3.05	(4 - 10 ft)
58-10-02	U4S	Shaker Pad Area	5,439.5	(7,111 yd^3)	0.61 - 1.83	(2 - 6 ft)
58-10-05	U4X	Eastern Drainage Channel (Area X)	90.6	(119 yd^3)	1.22 - 1.83	(4 - 6 ft)
58-10-04	U4W	Southern Drainage Channel (Area W)	362.5	(474 yd^3)	0 - 2.44	(0 - 8 ft)

m^3 = cubic meters
yd^3 = cubic yards

D.1.3.5 UC-3 Well Area

The following table provides volume estimates for soils determined to be in excess of the PAL for TPH within the UC-3 area.

Corrective Action Site (CAS)	General Site Notation	Description	Estimated Volume (m^3)		Within the Interval (m)	
58-09-06	U3E	Mud Pit E	1,700.3	(2,222 yd^3)	0 - 3.05	(0 - 10 ft)
58-25-01	U3E	Mud Pit E (Southern Outlier)	25,709.5	(33,600 yd^3)	0 - 5.49	(0 - 18 ft)
58-10-01	U3S	Shaker Debris Area	141.7	(185 yd^3)	1.22 - 1.83	(4 - 6 ft)
58-99-01	U3U	Protruding Pipes Under Ground Storage Tanks (UST) (Area U)	11.4	(15 yd^3)	1.22 - 2.44	(4 - 8 ft)
58-44-03	U3Z	Shaker Debris Area Southeast (Area Z)	783.4	(1,024 yd^3)	0 - 0.61	(0 - 2 ft)

m^3 = cubic meters
yd^3 = cubic yards

D.1.3.6 UC-1 Well Area

The following table provides volume estimates for soils determined to be in excess of the PAL for TPH within the UC-1 area.

Corrective Action Site (CAS)	General Site Notation	Description	Estimated Volume (m^3)	Within the Interval (m)
58-09-02	U1A	Mud Pit A	544.0 (711 yd^3)	0 - 1.22 (0 - 4 ft)
58-09-05	U1E	Mud Pit E	636.5 (832 yd^3)	0 - 1.22 (0 - 4 ft)
58-10-03	U1S	Shaker Debris Area	1,088.2 (1,422 yd^3)	0 - 1.22 (0 - 4 ft)
58-44-06	UY1	Surface Depression (Area Y)	22.7 (30 yd^3)	0 - 0.61 (0 - 2 ft)

m^3 = cubic meters
yd^3 = cubic yards

D.1.3.7 Central Mud Pit

The following table provides volume estimates for soils determined to be in excess of the PAL for TPH within the UC-1 area.

Corrective Action Site (CAS)	General Site Notation	Description	Estimated Volume (m^3)	Within the Interval (m)
58-09-01	CMP	Central Mud Pit	40,206.7 (52,556 yd^3)	0 - 1.83 (0 - 6 ft)

m^3 = cubic meters
yd^3 = cubic yards

D.2.0 Central Mud Pit Surface Investigation (CAS 58-09-01)

The CMP, CAS #58-09-01, is a large earthen pit located approximately 449.58 m (1,475 ft) southeast of the UC-1 well location (Figure D.2-1). The impoundment was used to store excess and used mud from drilling operations at various wells within the CNTA project area including the UC-3 and UC-4 emplacement holes. The CMP measures approximately 167.64 m by 131.06 m (550 ft by 430 ft), with the long axis of the pit running roughly east-west. The mud pit is fully bermed with the exception of an engineered breach to permit rainwater to drain from the impoundment. The southeastern perimeter of the CMP's berm has also been disturbed by a subsidence fault generated by the UC-1 (Faultless) underground nuclear detonation (DOE, 1994b).

D.2.1 Purpose

The purpose of soil/drill mud sampling at the CMP was to evaluate potential COCs and to determine their vertical and horizontal extent. Eleven boring locations were sampled inside the mud pit, and one boring was sampled outside the mud pit. In addition to investigation and characterization of the mud pit, several of the samples were included in the correlation study to determine the relationship in concentration of total chromium to that of hexavalent chromium within the same samples.

Waste characterization samples were collected from areas near the ESC soil borings from the intervals with the highest concentration of TPH and chromium as determined by the ESC sampling. The results of these samples provided data for guiding the disposal of investigation-derived waste (IDW) and for characterizing the contents of the impoundment for potential remedial options.

Subsurface and surface geophysical surveys were conducted over the area of the CMP prior to and concurrent with soil boring and sampling efforts to determine the approximate vertical and lateral extent of the drilling muds.

D.2.2 Scope of Work

Investigation of the CMP by advancing soil borings and collecting soil samples was conducted on three days: May 12 and 13, 1997, and again on June 1, 1997.

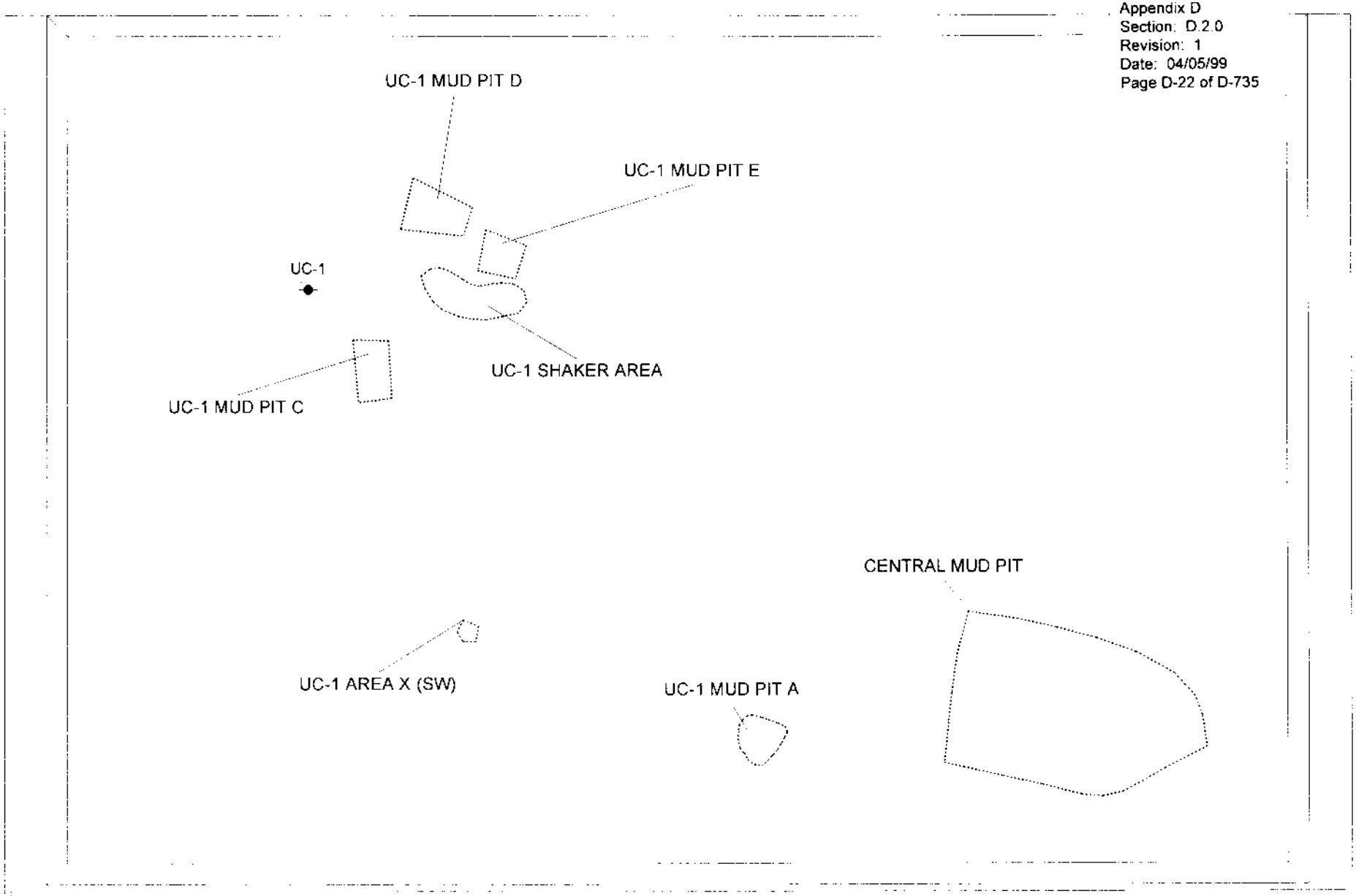


Figure D.2-1
Central Mud Pit Location Map

Mud pit investigation activities were conducted by multiple contractors as part of an ESC approach to the characterization. McLaren/Hart provided staff and equipment to advance soil borings and to collect soil cores. IT Corporation provided staff and equipment to prepare and handle soil samples and collect the appropriate QA/QC samples. Technos Incorporated performed geophysical investigations prior to and concurrent with sampling. IT Corporation and Ames Laboratory provided technical input to the selection of soil boring locations and the depth intervals to be sampled.

D.2.2.1 Survey Grid and Elevations

The survey grid was established over an area of 402.34 - 219.46 m (1,320 x 720 ft) (Figure D.2-2). The extent of the grid was selected to include all of the mud pits and key features. Aerial photos, existing drawings, and on-site observations were used to select the boundaries of the grid. It was not feasible to include some outlying features within the grid.

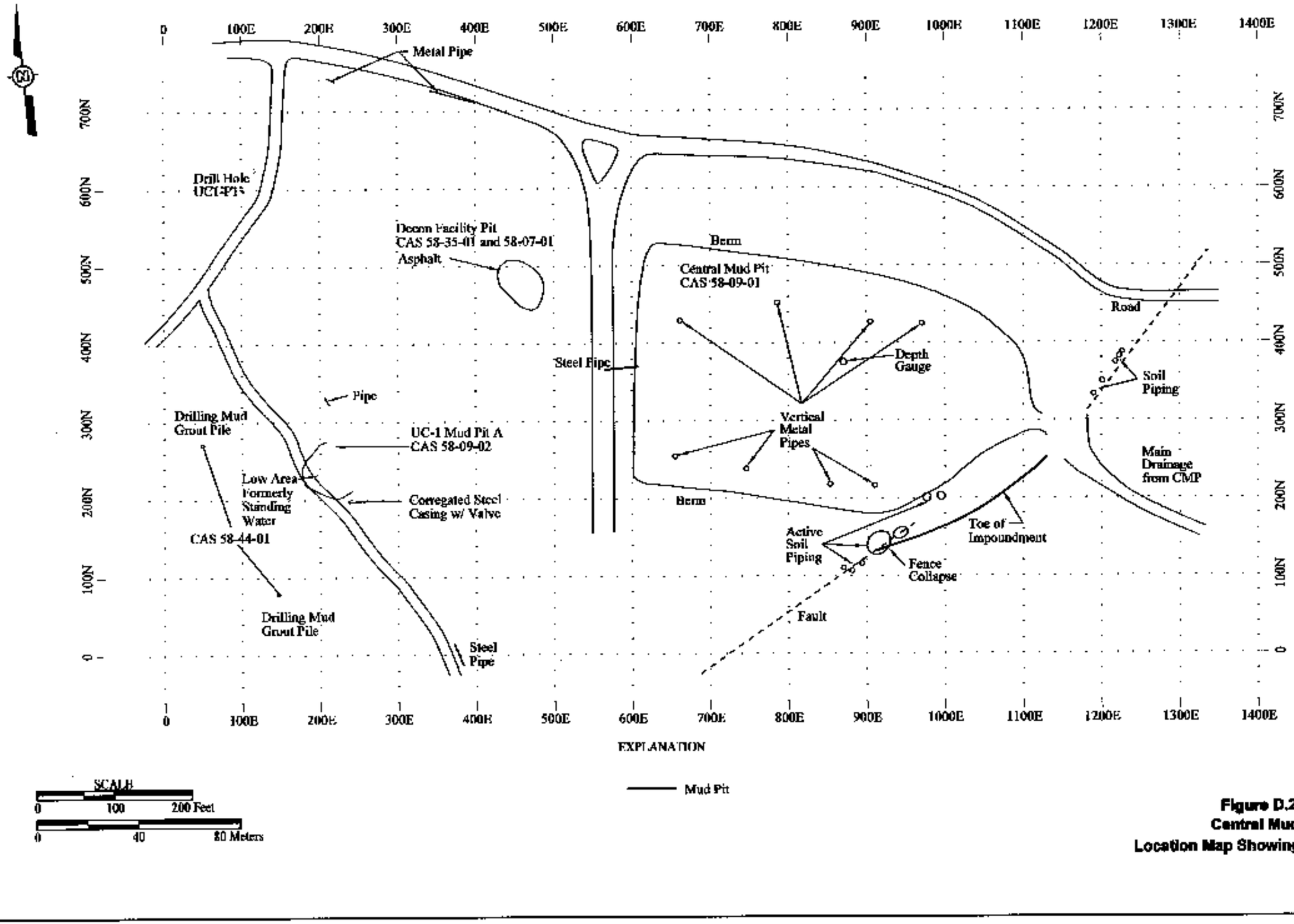
All field observations, measurements and coordinates given in the following text are referenced to the grid northing and easting coordinates in feet. Local grid coordinates were translated into UTM coordinates during field operations for compatibility with existing DOE databases. See Attachment A for a table of control points for the CMP area.

Digital elevation data were acquired for 759 stations over the entire grid generally at 12.19 m (40-ft) sample spacings. Attachment H provides an elevation map for the CMP grid. Elevations at the CMP grid range from 1,835.51 to 1,849.10 m (6,022 to 6,067 ft) and average 1,842.42 m (6,044.7 ft). Details regarding elevational data are provided in Attachment B.

D.2.2.2 On-site Observations

Figure D.2-2 shows the site features in relation to the rectangular grid that surrounds the CMP. The CMP is bounded on all sides by a steep berm extending about 3.05 m (10 ft) above the surface of the mud. The berm has an engineered breach on the eastern end, and a drainage channel extends southeast from the breach. The mud consists of a 8 to 15 cm (3 to 6 in.), dark, oily crust with moist, semi-liquid material beneath it. Eight vertical diffusers and a wooden depth gauge are located within the pit. A large steel pipe extends into the pit from the west.

A fault from the Project Faultless detonation at UC-1 extends southwest to northeast and abuts against the CMP berm on its southeastern side. Numerous soil piping and active collapse zones



EXPLANATION

Mud Pit

SCALE
0 100 200 Feet
0 40 80 Meters

Figure D.2-2
Central Mud Pit
Location Map Showing Site Features

were observed along this fault and on the southern berm of the CMP. Some of these collapse features are located on the inside slope of the berm, very close to the mud.

D.2.2.3 Surface Geophysics

The following section describes the types and nature of the geophysical surveys conducted within the area of the CMP.

EM31

EM31 data were acquired over the main grid along parallel lines oriented west-east with a line separation of 6.01 m (20 ft) (Figure D.2-3). The lines extend over the grid outside and inside the CMP. Data were not acquired around the immediate perimeter of the CMP due to the steep berm.

EM38

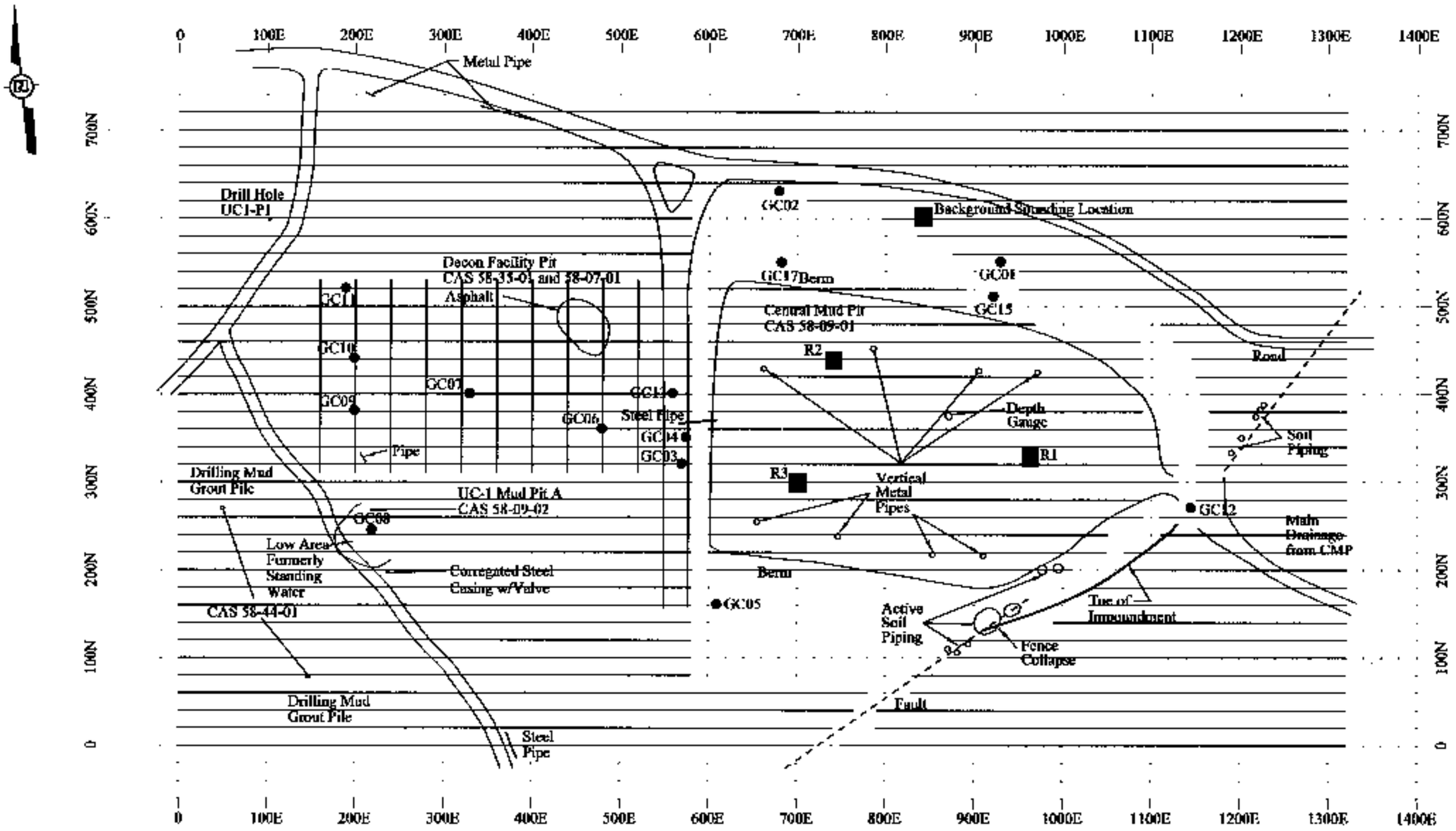
EM38 quadrature phase (conductivity) data were acquired within the CMP only, along parallel lines with a 6.01-m (20-ft) line spacing oriented west-east (Figure D.2-3). This shallow data provided an indication of the lateral continuity of the shallow muds within the CMP. When combined with EM31 data, the EM38 data also provide a qualitative estimate for the thickness of the mud within the CMP.

Resistivity

In order to determine the vertical stratification of muds within the CMP, three resistivity soundings were acquired within the mud pit, along with a background resistivity sounding north of the mud pit. Figure D.2-3 shows the locations of the four resistivity soundings. The background sounding was north of the CMP with the electrodes extending east-west along the gravel road north of the mud pit. Sounding R1 had electrodes extending south-north within the eastern portion of the mud pit. Sounding R2 had electrodes oriented southwest-northeast. Sounding R3 had electrodes oriented southeast-northwest.

D.2.2.4 Geoprobe™ Conductivity Logs

Geoprobe™ conductivity logs were acquired at 17 locations within the grid. Locations are shown in Figure D.2-3 and are labeled sequentially CMP-GC01 through CMP-GC17. No logs were collected inside the CMP due to the low load-bearing capacity of the mud. Plots of all conductivity logs are included in Attachment E.



SCALE
0 100 200 Feet
0 40 80 Meters

EXPLANATION
- Fault
- Mud Pit
- Resistivity Sounding
- EM31 Survey Lines
- Geoprobe Conductivity Boring

Figure D.2-3
Central Mud Pit
Location Map for Geophysical Investigations

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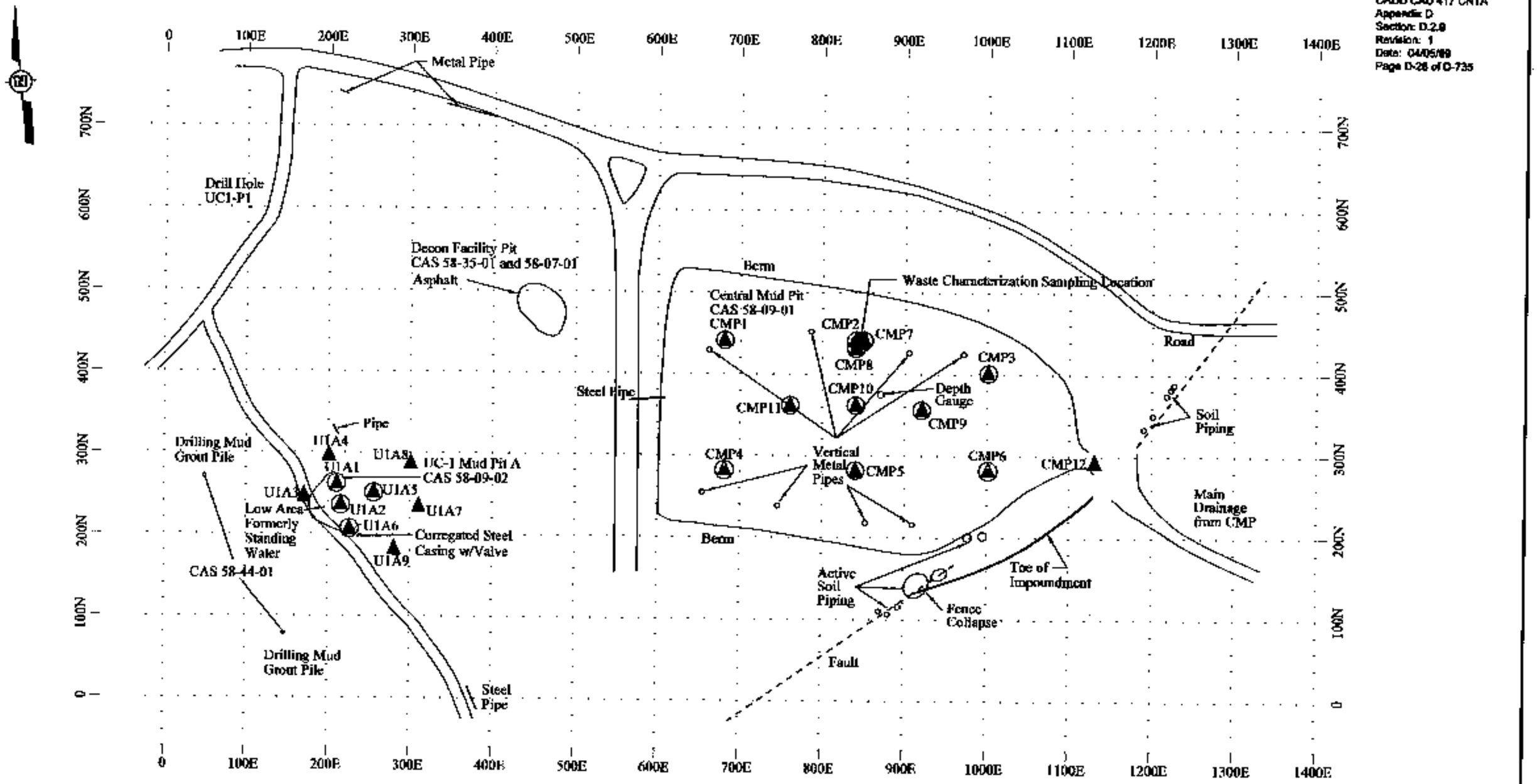
D.2.2.5 Chemical Sampling and Analysis

Eleven soil borings were completed within the CMP for the purpose of collecting soil samples. Attachment I provides the coordinates of the soil borings. Figure D.2-4 illustrates their locations within the CMP. Borings ranged in depth from 0.61 to 3.05 m (2 to 10 ft). The initial six borings (CMP1 thru CMP6) were located within the mud pit as specified in the CAIP. The mud pit was divided into six roughly equal area sections by bisecting the mud pit along its long axis and trisecting the mud pit in the short dimension. A boring was located near the center of each of the sections. Two additional borings (CMP7, CMP8) were located near the CMP2 boring to investigate an apparent thin layer of drilling mud within this area. Boring numbers CMP9, CMP10, and CMP11 were along the centerline of the mud pit. Three additional waste characterization borings were advanced within the CMP for purposes of IDW disposal and mud pit characterization. The location of these borings and the sample intervals were determined from previously completed ESC investigation-related borings. The location of these borings is provided in Figure D.2-4.

All borings were advanced to their total depth using conventional, direct-push boring equipment advanced using hand methods. Due to the instability of the mud pit surface, it was not practical to conduct sampling with truck-mounted equipment.

Soil samples collected from individual borings were submitted to on-site and off-site laboratory facilities for analysis. Thirty-seven samples were collected during the investigation of the CMP. These samples were submitted to the on-site laboratory facilities for the analysis of chromium (total and hexavalent) and TPH diesel. Characterization samples were handled as described in Section 1.2.3, “Phase 2 Work Scope”.

A correlation study was performed on soil samples collected for on-site analysis as specified in the CAIP (Appendix C). The results for on-site analysis of total chromium by XRF were compared with those using FLAA from the same sample. The correlation coefficient resulting from this study, if greater than the CAIP specified 0.95, would then allow for XRF methods to be used to estimate total chromium concentrations of the individual samples and permit the reduction of the verification of XRF chromium results by FLAA methods to one-per-twenty samples analyzed.



SCALE
0 100 200 Feet
0 40 80 Meters

EXPLANATION
- Fault
- Mud Pit
- Soil Boring Locations
- Soil Boring Location with Chemical Samples Exceeding 100 mg/kg TPH
- Waste/Mud Pit Characterization Sampling Location

Figure D.2-4
Central Mud Pit
Soil Boring Location Map

D.2.3 Summary of Results

The following sections provide the results of geophysical and chemical investigations of the CMP.

D.2.3.1 Geophysical Measurements

The results of geophysical investigations within the CMP area are provided in the following sections.

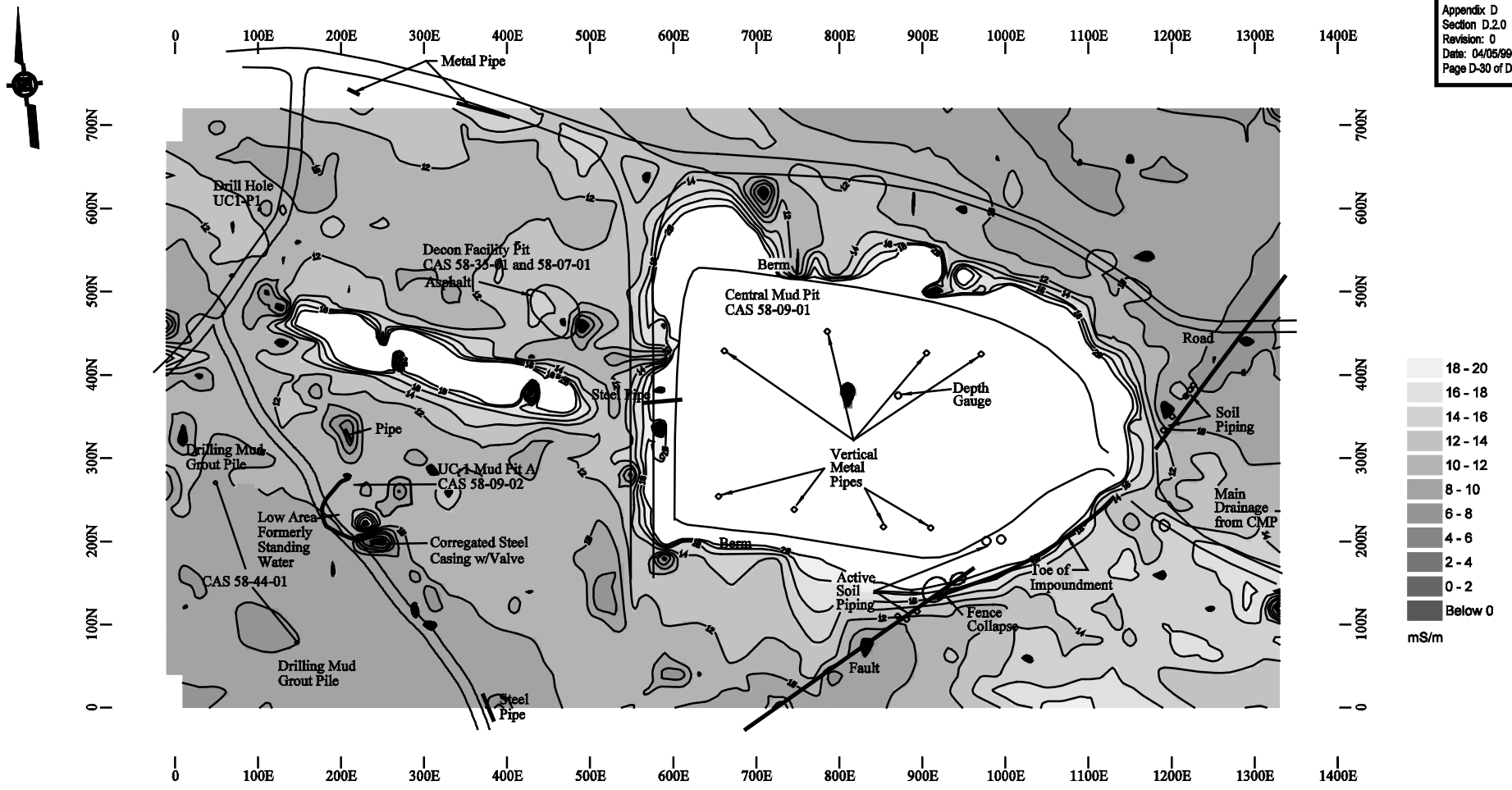
Surface EM

EM31 conductivity and in-phase (metal) contour maps are shown in Figures D.2-5 and 2-6. The most obvious feature defined by the EM31 survey is the CMP (CAS #58-09-01).

The in-phase (metal) data show an anomaly trending east-west down the center of the CMP (Figure D.2-6). The western end of this anomaly starts near a large steel pipe that extends into the mud pit from the west. The pipe may continue beneath the mud down the central axis of the pit. This anomaly intersects another in-phase (metal) anomaly extending south-north near the middle of the mud pit. Both of these anomalies are also seen in the conductivity data.

Outside the influence of the two perpendicular pipes, extremely high conductivity values (>240 milliSiemens per meter [mS/m]) are present within the CMP (Figure D.2-6). The highest conductivity values are within the southeastern portion of the mud pit. The high conductivities are constrained within the pit boundaries except for the breach in the berm at the east end. However, the high conductivities decrease rapidly and do not continue more than 15.24 m (50 ft) past this breach down the drainage channel.

Figure D.2-7 shows EM38 data acquired within the CMP. The highest conductivities are less than 200 mS/m and are more uniform than the EM31 data. This difference suggests that the high conductivity concentration in the southeastern portion of the pit observed in the EM31 data is due to deeper material and a thickening of the mud. Also, there is no evidence for the buried pipes in the EM38 data, suggesting that the pipes are below the average exploration depth of the EM38, which is about 1.52 m (5 ft).



EXPLANATION

- Fault
- Mud Pit
- Conductivity Contours

SCALE

0 100 200 Feet

0 40 80 Meters

Contour Interval = 2 mS/m

Figure D.2-5
Central Mud Pit
EM31 Surface Conductivity Map

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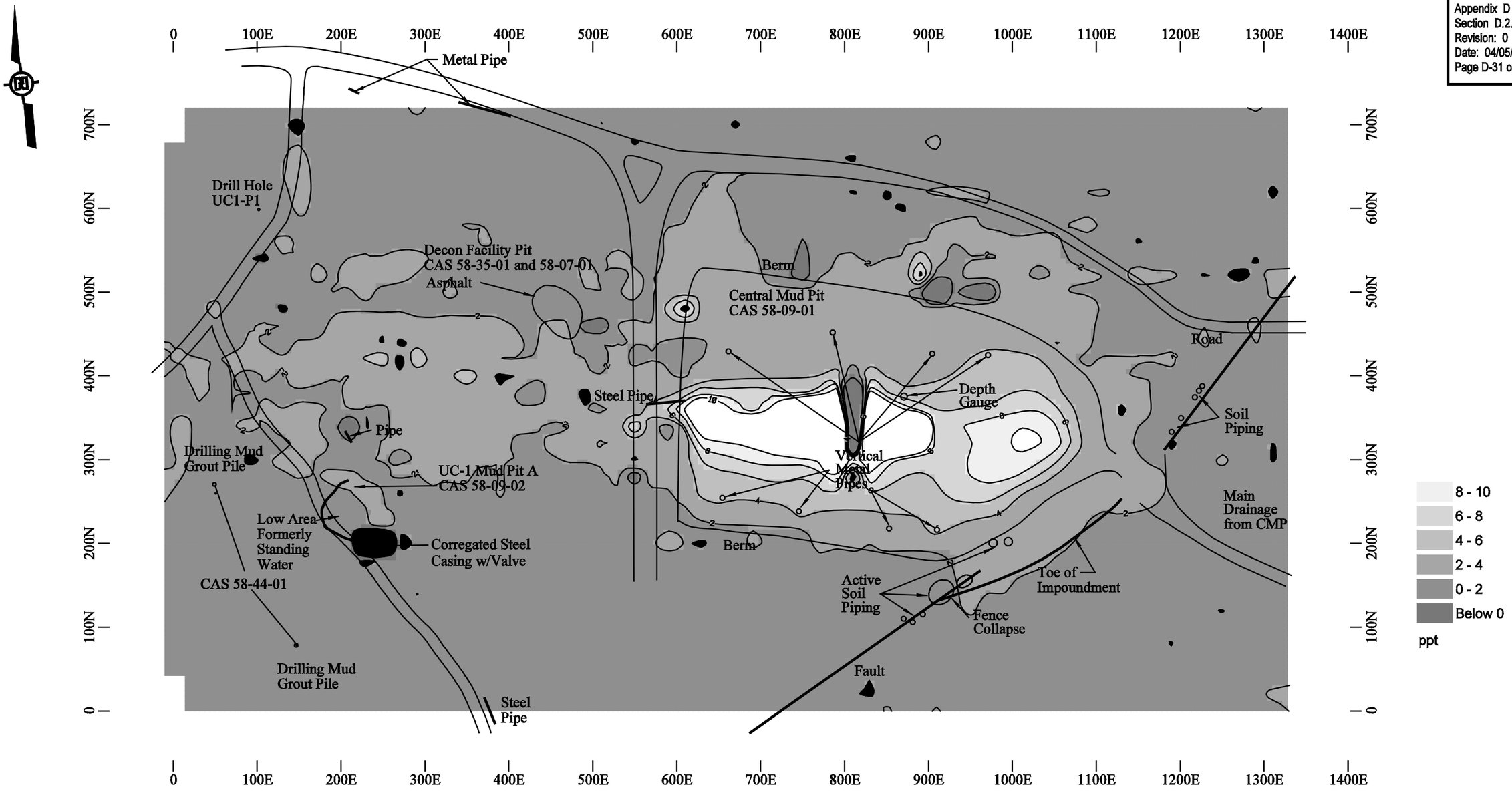

EXPLANATION

- Fault
- Mud Pit
- In-phase Contours

SCALE

0 100 200 Feet

0 40 80 Meters

Contour Interval = 2 ppt

Figure D.2-6
Central Mud Pit
EM31 In-Phase Metal Survey

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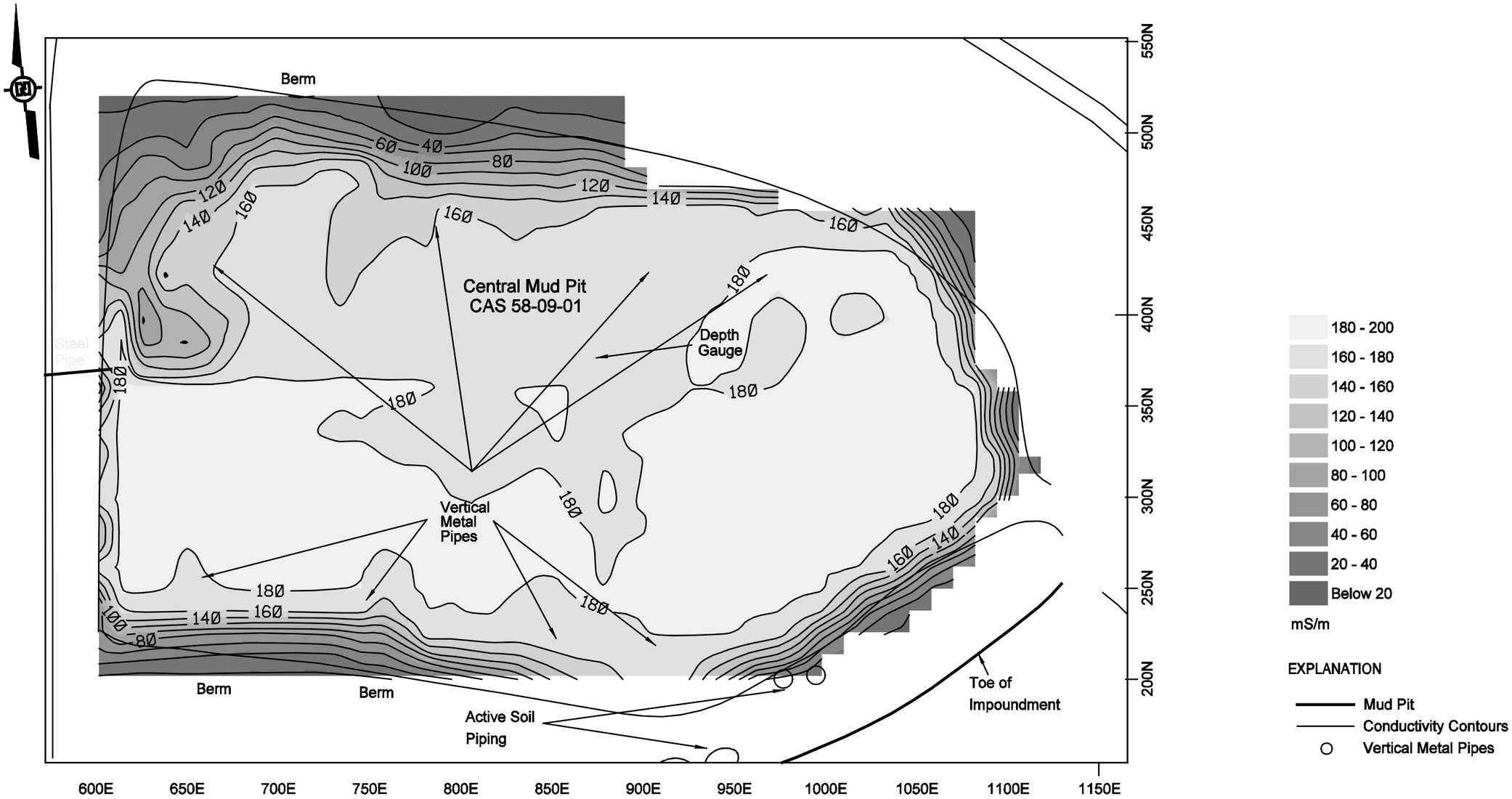

SCALE
0 50 100 Feet
0 20 40 Meters

Contour Interval = 20 mS/m

Figure D.2-7
EM38 Conductivity Survey

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12 MAY 1999

Resistivity

Resistivity soundings acquired within the mud pit provide a means to estimate the vertical extent of the mud. Figure D.2-8 shows the geoelectric sections for three resistivity soundings acquired within the CMP and one background sounding outside and north of the CMP.

The background sounding model shows resistivities ranging from 282 to 1,235 ohm-ft. (11.6 to 2.7 mS/m). This sounding represents background conditions and correlates well with the measurements made with the EM31.

Sounding R1, in the eastern side of the CMP, is interpreted as the thickest mud based upon the surface EM31 and EM38 data. The model for the resistivity sounding shows low resistivity values of 4.7 to 6.6 ohm-ft (highly conductive values of 497-698 mS/m) to a depth of about 1.74 m (5.7 ft).

Resistivity soundings R3 and R2 were in areas of consecutively lower conductivities as indicated by the EM31 and EM38 data and therefore, are located over a thinner layer of mud. The model for sounding R3 indicates a 1.34 m (4.4-ft) thick layer of 4.8 ohm-ft (684 mS/m) material. The model for sounding R2 shows only a thin layer (0.5 m [1.6 ft]) of low resistivities (1.1 ohm-ft (2,983 mS/m).

The resistivity models generally agree with interpretations of EM31 and EM38 data. The thickest area of mud, about 1.74 m (5.7 ft), is located in the southeastern portion of the mud pit. Areas with conductivities less than 100 mS/m measured by the EM-31 may only contain about 0.61 m (2 ft) of mud.

Conductivity Logs

No Geoprobe™ conductivity logs were acquired within the CMP itself, due to the soft and unstable conditions of the mud. Two conductivity logs were acquired on the inner ramp of the northern berm, and four conductivity logs were acquired around the perimeter outside the berm (see Figure D.2-2). One conductivity log (CMP-GC15) on the inner ramp of the berm had high conductivities (up to 390 mS/m, but averaging <100 mS/m) between 4.27 and 6.01 m (14 and 20 ft) deep. Because of its depth, this reading is interpreted to be due to natural clays and silts or variations in moisture content. All other conductivity logs on the inner ramp and around the outside perimeter indicate background conductivity conditions.

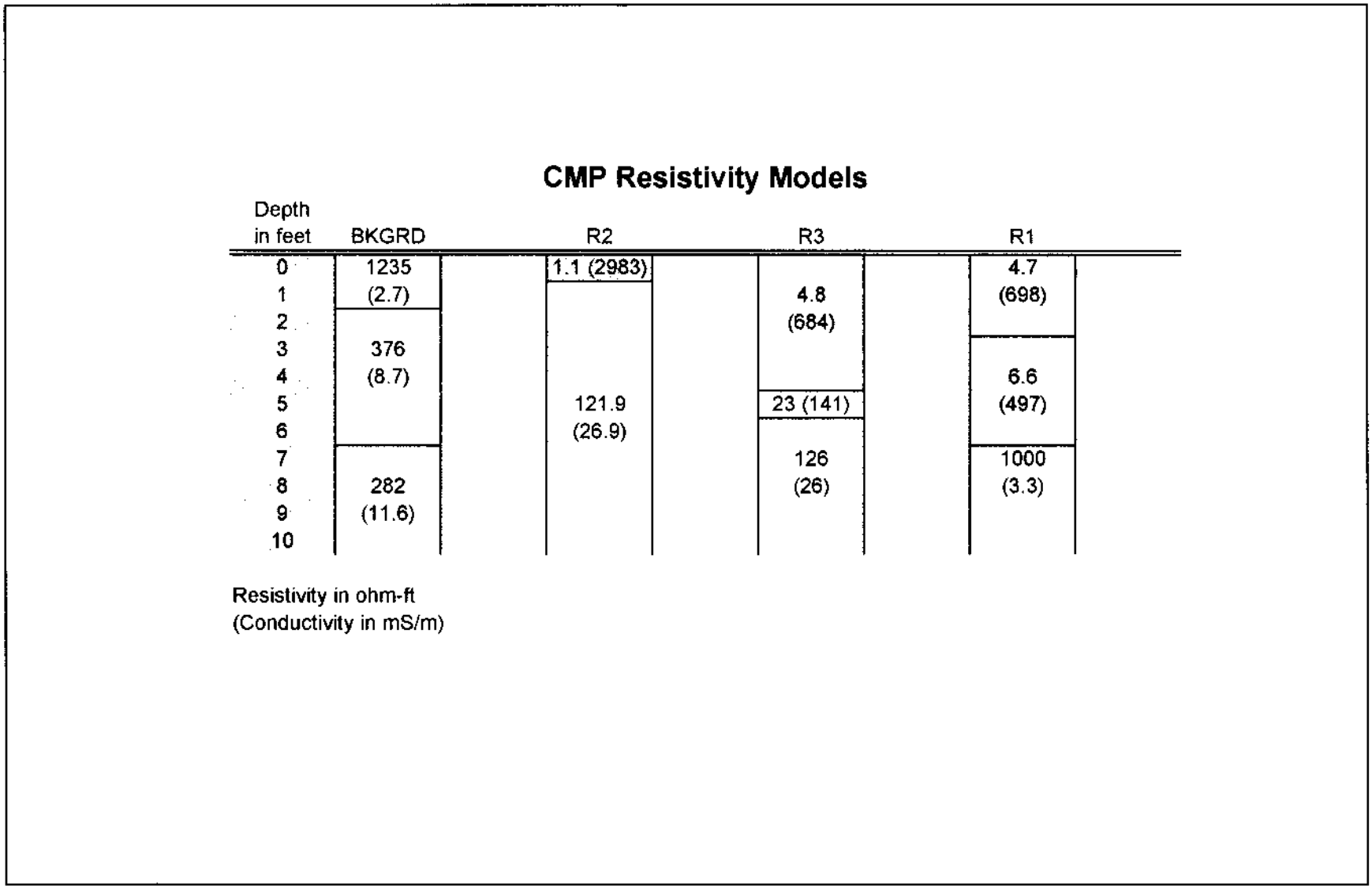


Figure D.2-8
Geoelectric Sections for Resistivity Soundings
Central Mud Pit

D.2.3.2 Chemical Sampling and Analysis

The CMP contained a significant volume of drilling mud that had combined TPH diesel and motor oil concentrations in excess of the PAL of 100 mg/kg. No radionuclide contaminants were noted with activities exceeding natural background levels. All borings advanced in the CMP encountered drilling muds in excess of the PAL for combined diesel/motor oil range TPH. The highest combined TPH diesel/motor oil concentration noted was from the interval 0 - 0.61 m (0 - 2 ft) in boring CMP6 which yielded a result of 2,560 mg/kg. Hexavalent chromium was apparent only at concentrations well below the PAL. A summary of the analytical results for the CMP along with associated quality assurance sample results are provided in Attachment F. Figure D.2-9 displays TPH data with respect to depth at all of the CMP sampling locations.

Initial TPH analyses of samples from borings in the CMP were specifically for TPH in the diesel range. It was noted during analysis that soil/drilling mud samples contained TPH in the range of motor oil. Additional standards were procured for TPH motor oil, and instruments were also calibrated to detect TPH of motor oil.

Statistical evaluation of the sample results for discrete 0.61-m (2-ft) intervals within borings indicate that the upper 1.83 m (6 ft) of drilling mud and materials contained within the CMP have combined diesel/motor oil TPH concentrations in excess of the PAL. A summary of the statistical layer analysis for the CMP is provided in Table D.2-1.

In the borings CMP1 through CMP7 which penetrated at least 0.61 m (2 ft) into the native material, TPH concentrations in the native material samples were below the PAL. In borings CMP8 through CMP11 refusal was reached at or just beneath the drilling mud/native material contact. The TPH concentrations in the bottom samples of each of these holes was above the PAL. However, inspection of the boring logs and sample collection logs shows that these samples contained 15 cm (6 in.) to 0.61 m (2 ft) of drilling mud. Based on the following facts:

- The native material samples from borings CMP1 through CMP7 did not have TPH concentrations above the PAL.
- All of the samples from borings CMP8 through CMP11 contained some drilling mud.
- The TPH concentrations were lower in the last sample from borings CMP8 through CMP10;

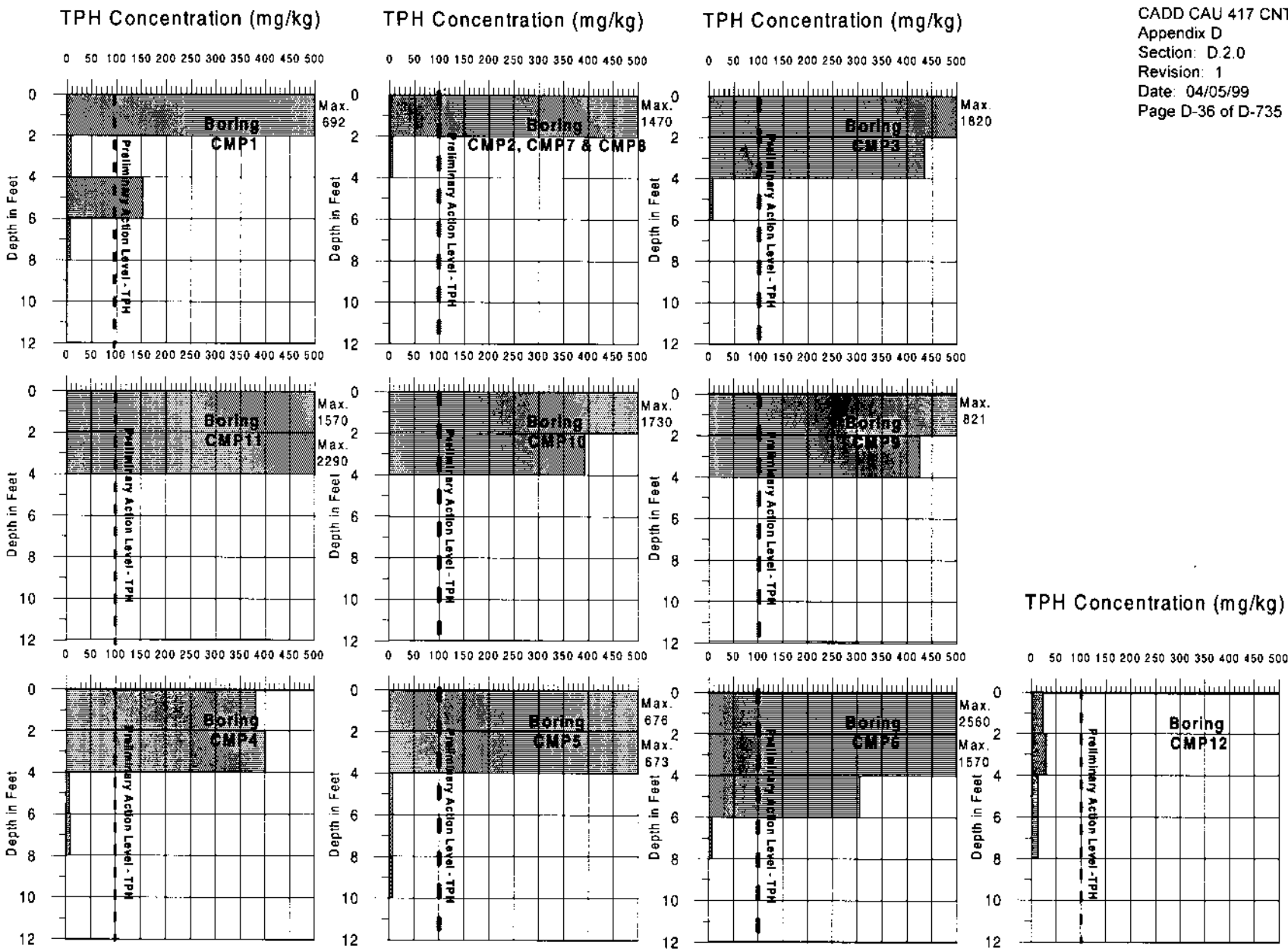


Figure D.2-9
Central Mud Pit TPH Concentrations from Chemical Sampling

Table D.2-1
Statistical Analysis of Mud Pit Sampling
Central Nevada Test Area - Central Mud Pit

Area of Investigation	Sampling Interval/Layer	Analyte	Boring Number											Statistically Derived Required No. of Samples	Concentration Above (+) or Below (-) Action Levels	Layer Determination
			cmp1	cmp2	cmp3	cmp4	cmp5	cmp6	cmp7	cmp8	cmp9	cmp10	cmp11	(Nd)	(<>+U-AL)	
Central Mud Pit	0-2'	TPH	692	1230	1820	382	676	2560	903	1470	821	1730	1570	3	1425	contaminated
"	2-4'	TPH	8.9	5.6	434	401	673	1570	6.1	H	426	392	2290	14	846	contaminated
"	4-6'	TPH	152.3	R	7	6.2	7.1	305.6	R	R	R	R	NS	6138	87	contaminated
"	6-8'	TPH	6.3		R	8.5	7.2	5.5					NS	1	-92	non-cont.
"	8-10'	TPH	NS			NS	6.7	NS					NS	NA	NA	NA
Central Mud Pit	0-2'	Cr+6	22.7	28.1	21.9	30.5	43.2	56.5	22.4	21.6	53	32.6	64.7	1	-347	non-cont.
"	2-4'	Cr+6	69.8	122	16.9	20.3	25.3	28.5	169	151	17.3	16.6	30	1	-305	non-cont.
"	4-6'	Cr+6	102	R	174	103	107	14.1	R	R	R	R	R	1	-251	non-cont.
"	6-8'	Cr+6	64	R	R	64	113	144						1	-262	non-cont.
"	8-10'	Cr+6	NS			NS	91.2	NS						NA	NA	NA
			cmp12													
Central Mud Pit Breach	0-2'	TPH	23.1											NA	-76.9	NA
"	2-4'	TPH	29.9											NA	-70.1	NA
"	4-6'	TPH	13.6											NA	-86.4	NA
"	6-8'	TPH	13.4											NA	-86.6	NA
"	8-10'	TPH	NS											NA	NA	NA
Central Mud Pit Breach	0-2'	Cr+6	50											NA	-340	NA
"	2-4'	Cr+6	50											NA	-340	NA
"	4-6'	Cr+6	50											NA	-340	NA
"	6-8'	Cr+6	50											NA	-340	NA
"	8-10'	Cr+6	NS											NA	NA	NA

NOTES:

All values are reported as milligrams/kilogram (mg/kg)

Nd = number of samples needed to make decision

<> = mean value of all measurements in given layer

U = upper confidence limit

AL = action level (100mg/kg TPH & 390 mg/kg Hex Cr)

If <>+U-AL > 0 then layer is above Action Level But if <0 then layer is below Action level

TPH = sum of diesel and motor oil components

NS = Sample not collected

NA = Not analyzed

R = No sample collected due to refusal conditions within boring

H = Sample collected and held by laboratory and not analyzed

cmpx = Boring and associated samples included in statistical calculations

- CMP8 - second sample not run because the boring is next to CMP7 in which the second sample had a TPH concentration of 6 ppm,

- CMP9 - the second sample TPH concentration was 52 percent of the concentration in the first sample,

- CMP10 - the second sample TPH concentration was 22 percent of the concentration in the first sample.

- The TPH concentration in the last sample from CMP11 was higher than the concentration in the first sample (the last sample was all drilling mud and did not contain any native material).

It is reasonable to assume that the TPH came from the drilling mud and that the native material does not have TPH concentrations above the PAL.

The estimated volume of material considered TPH-contaminated includes a surface area measuring 167.64 m (550 ft) in length and 131.06 m (430 ft) in width, extending to a depth of 1.83 m (6 ft). Based on these numbers the total volume of TPH-contaminated drilling material and muds contained within the CMP is estimated to be approximately 40,207 cubic meters (m^3) (52,556 cubic yards [yd^3]).

The distribution of drilling mud within the CMP was nearly what was predicted by geophysical surveys and confirmed by Geoprobe™ soil borings. Boring logs and cross-sectional views illustrating the CMP are provided in Attachment J. Drilling muds were observed to be approximately 1.83 m (6 ft) thick at their thickest point in the southeast corner of the mud pit. Drilling muds in excess of the PAL taper from this point to thicknesses of 0.61 - 0.91 m (2 - 3 ft) near the western perimeter of the mud pit. Samples collected from soils and excavated native soils from beneath the mud pit did not contain concentrations of TPH in excess of the PAL. In addition, a soil boring (CMP12) located just outside the southeastern edge of the CMP, at the breach in the CMP berm, did not have concentrations of TPH in excess of the PAL.

Three waste management samples were collected from the CMP for off-site analysis. These samples were collected proximal to soil borings with known concentrations of combined TPH (motor oil + diesel) in excess of the PAL. The results of these sample analyses are detailed in Section 6.2.3. Based on these results, all IDW generated from sampling activities within the CMP was disposed of as TPH contaminated waste.

D.3.0 UC-1 Well Area Surface Investigations

The UC-1 well area is located within a 2.59 square kilometers (km^2) (1-square mile [mi^2]) parcel of land in the central portion of the CNTA project area. The area was the site of several well drilling operations, most notably the UC-1 emplacement well. The UC-1 well was the emplacement hole for the Faultless underground nuclear test conducted on January 19, 1968. Several other wells were completed proximal to the UC-1 well location which served as exploratory wells, hydrologic testing wells, post-shot, and instrument placement wells. Most of these wells were plugged and abandoned in accordance with applicable requirements when the site was decommissioned (AEC, 1973a). The wells which were not plugged were turned over to the BLM for their use (AEC, 1973a). No further work is planned on these wells. Suspect areas of surface contamination are related to operations surrounding the drilling and completion of these wells. Five CASs were identified for investigation within the UC-1 area. In addition to these CASs, three other areas were investigated, based on proximity to areas of identified contamination and visual observations that suggested potential surface contamination. A map showing these areas is shown as Figure D.3-1.

D.3.1 Purpose

Soil sampling within the UC-1 area was conducted to evaluate COCs within five CASs that were identified in the CAIP and three other sites that were suspected of being affected by surface contamination from drilling and well completion operations. The vertical and lateral extent of the COC were defined for each of the sites.

D.3.2 Scope Of Work

Surface investigation and sampling of five CASs and three additional suspect sites were conducted from May 28 through May 30 and June 1, 3, and 8, 1997. Six days were spent advancing soil borings and collecting composite soil samples from these sites. The investigated sites included mud pits, shaker areas, and a disturbed area as follows:

- Mud Pit UC-1 A (CAS #58-09-02)
- Mud Pit UC-1 B (CAS #58-09-04)
- Mud Pits UC-1 C, D, E (CAS #58-09-05)
- UC-1 Shaker Debris Area (no assigned CAS #58-10-03)
- UC-1 Areas X Grout Piles (3) (58-44-01, 58-44-02, 58-44-06)
- UC-1 Area Y, surface depression 3,600 ft south of UC-1 Well (CAS 58-44-06)

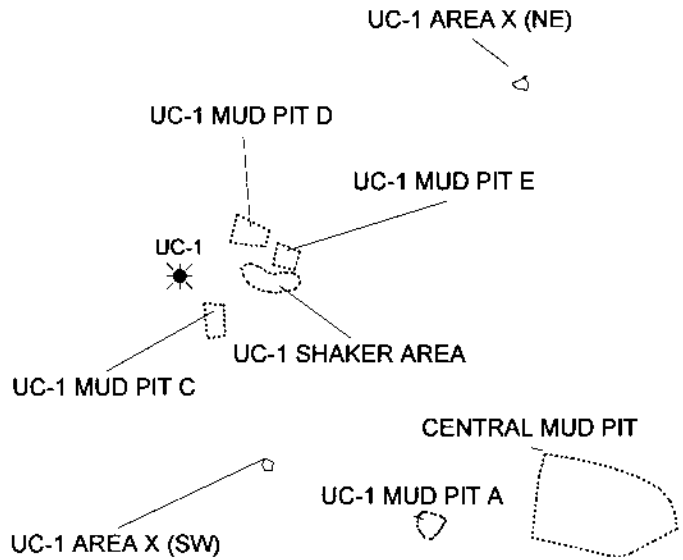


Figure D.3-1
UC-1 Area Mud Pit Location Map

N

0 347 694 1388
Scale = 694 feet

D.3.2.1 Survey Grid and Elevations

The survey grid was established over a rectangular area of 268.22 x 243.84 m (880 x 800 ft) (Figure D.3-2). The extent of the grid was selected to include all of the mud pits and key features at the site. Aerial photos, existing drawings (primarily from the CAIP), and on-site observations were used to select the boundaries of the grid. It was not feasible to include some outlying features within the grid due to the distances separating these areas from UC-1 area.

All field observations measurements and coordinates given in the following text are referenced to the grid northing and easting coordinates in feet. Local grid coordinates were translated into UTM coordinates during field operations for compatibility with existing DOE databases. See Attachment A for a table of control points for the UC-1 site.

Digital elevation data were acquired for 504 stations over the entire grid generally at 12.19-m (40-ft) sample spacings. Attachment H provides an elevation map for UC-1. Elevations at UC-1 range from 1,851 to 1,869 m (6,075.2 to 6,132 ft) and average 1,860 m (6,100 ft). Details regarding elevation data collection are given in Attachment B.

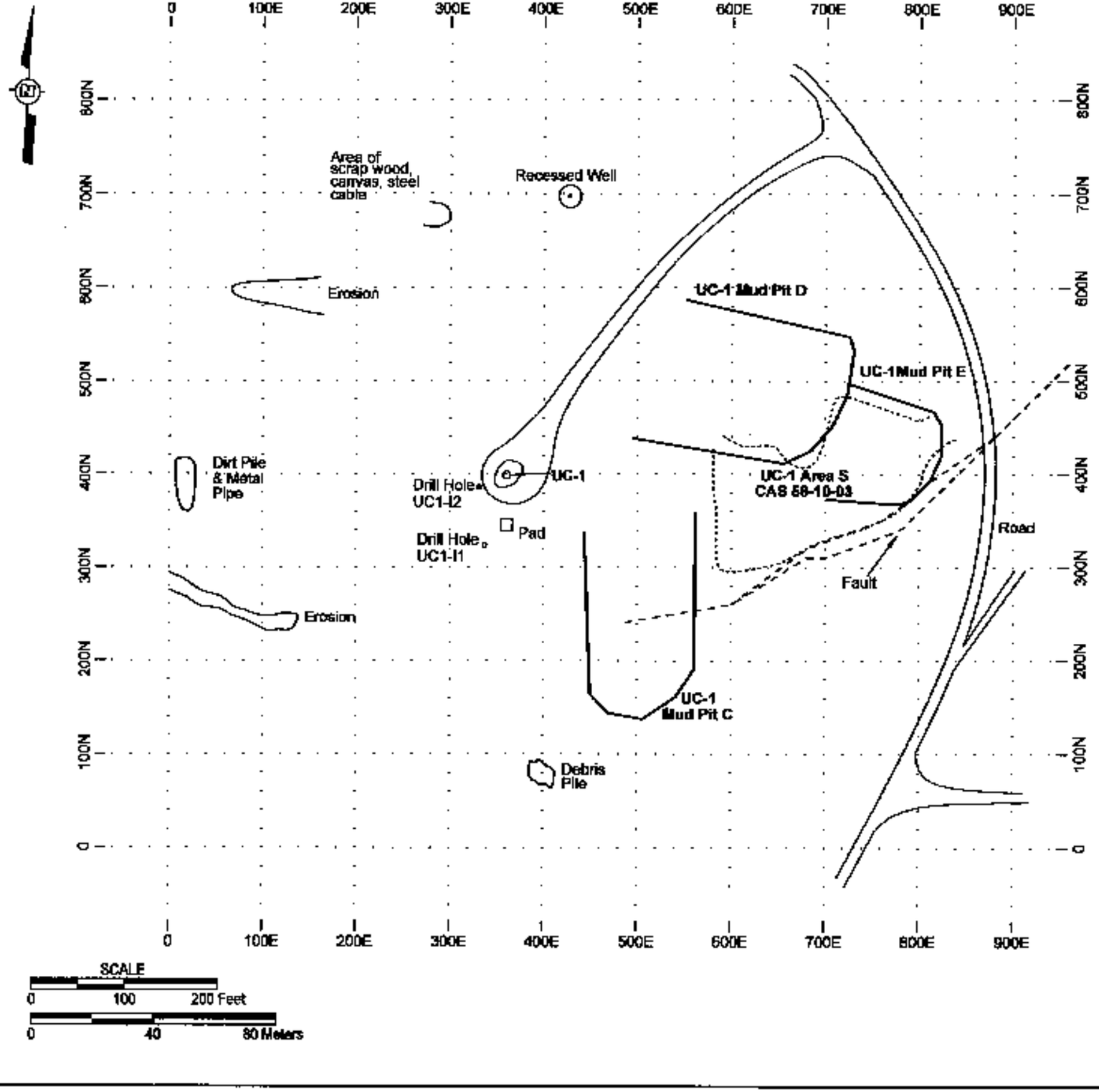
D.3.2.2 On-site Observations

Figure D.3-2 shows the locations of features relative to the survey grid established at the site. The suspected positions of the mud pits and shaker pad debris shown in Figure D.3-2 and other figures are based upon the CAIP drawings and aerial photos of this site. The survey grid extends eastward to the perimeter road and includes berms to the south and west. The emplacement well (surface ground zero) is located in the approximate center of the grid. A grate-covered, recessed well (UC-1-P-2SR) is located in the northern part of the grid. Fault scarps cross the southeastern portion of the grid, and may extend to the southwest. Light colored material, possibly shaker discharge, was observed in the eastern portion of the grid, draining to the east along the inner fault scarp.

D.3.2.3 Surface Geophysics

EM31 conductivity and in-phase (metal) data were acquired over six areas (Figure D.3-3):

- The site grid along parallel lines oriented north-south with a line separation of 6.01 m (20 ft), which covers Mud Pits 1C, 1D, 1E and the shaker pad debris



EXPLANATION

- Fault
- Mud Pit
- Shaker Pads Discharge Area
- EM31Survey Lines

Note:
UC-1 Mud Pits C,D, and E Are All CAS 58-09-05

Figure D.3-2
UC-1 Area Map,
Showing Site Features

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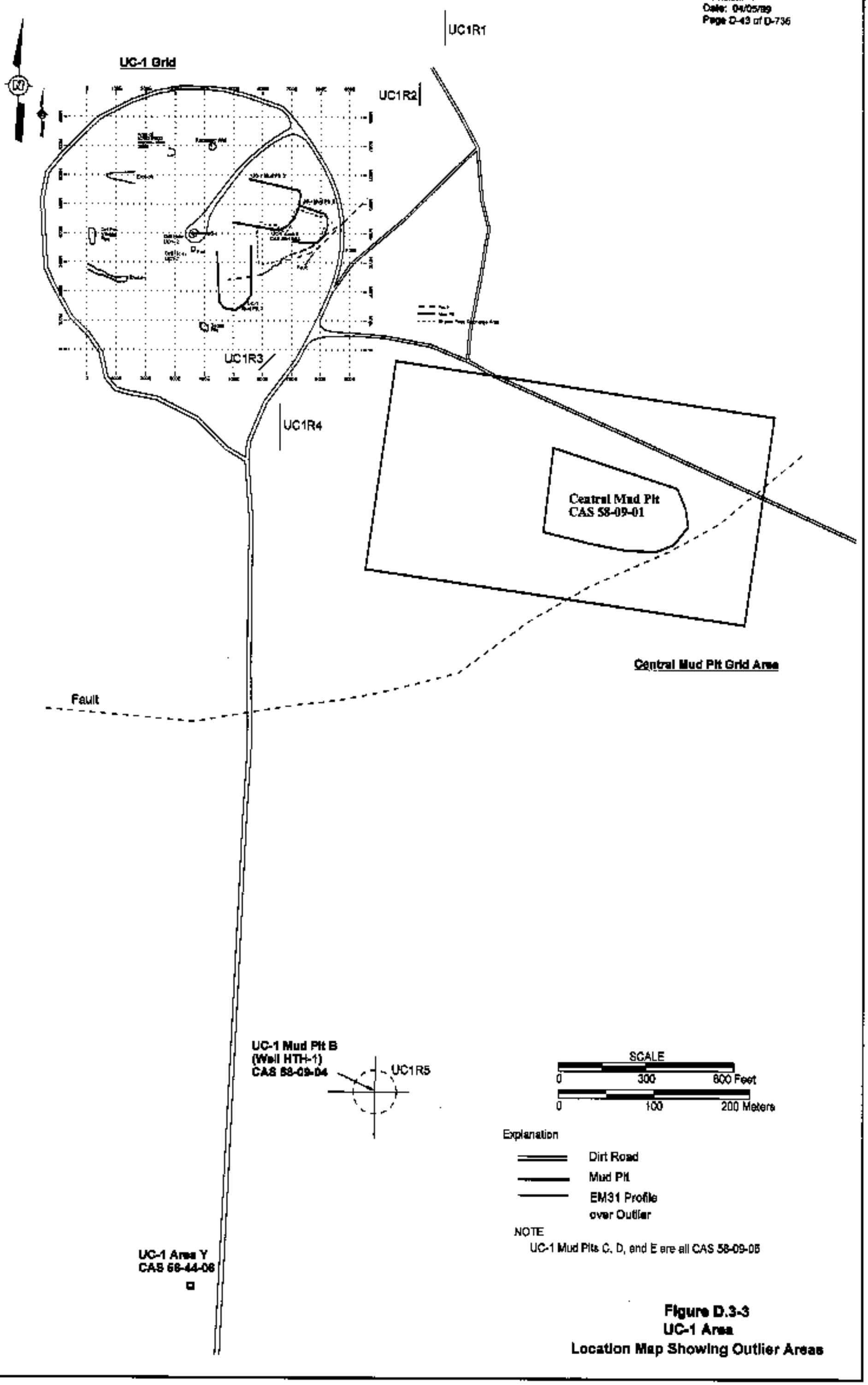


Figure D.3-3
UC-1 Area
Location Map Showing Outlier Areas

- Two perpendicular profile lines (UC1R5E and UC1R5N) centered at well HTH-1, the location proposed in the CAIP for Pit 1B (CAS #58-09-04), located 792.48 m (2,600 ft) south of the grid

- A single EM31 profile line over each of the two small grout piles south of the site grid and referred to as UC1R3 and UC1R4

- A single EM31 profile line over each of the two small grout piles northeast of the site grid and referred to as UC1R1 and UC1R2

Attachment C contains a more detailed description of the electromagnetic field procedures and the plots of all the off-site profile lines.

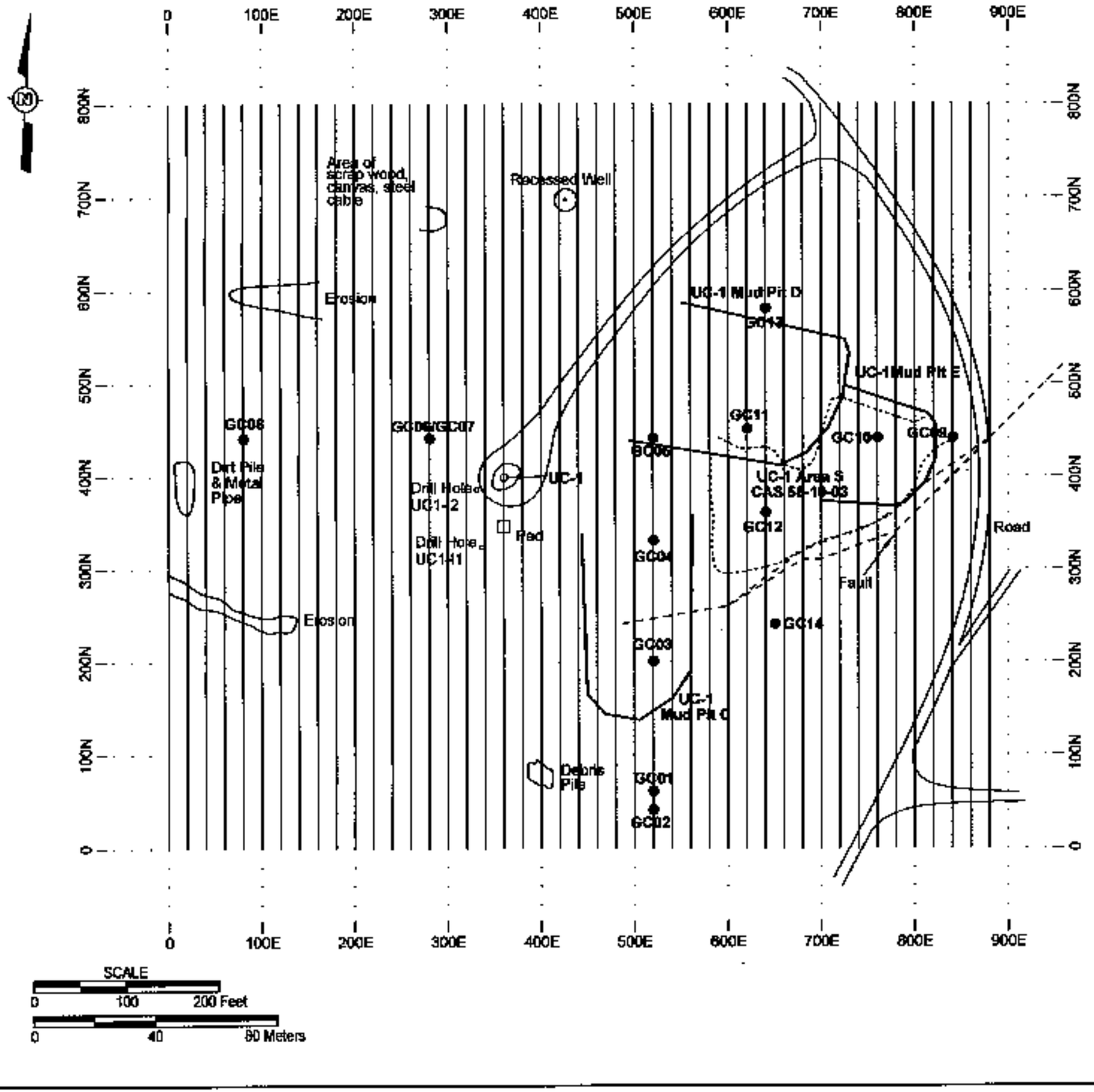
D.3.2.4 Geoprobe™ Conductivity Logs

Geoprobe™ conductivity logs were acquired at 14 locations within the grid. Locations are shown in Figure D.3-4 and are labeled sequentially UC1-GC01 through UC1-GC14. Plots of all conductivity logs are included in Attachment E.

D.3.2.5 Chemical Sampling and Analysis

Fifty-one soil borings were completed within the UC-1 area of investigation. Attachment I provides the coordinates of the soil borings. Borings ranged in depth from 0.61 to 3.66 m (2 to 12 ft). The initial six borings within each of the five UC-1 area mud pits were located as specified in the CAIP. The mud pit was divided into six roughly equal area sections by bisecting the mud pit along its long axis and trisecting the mud pit in the short dimension. A boring was located near the center of each of the sections. Borings within non-mud pit sites such as shaker debris areas were located within areas of visible drilling related materials.

Three waste characterization samples were obtained from two sites. Two waste characterization borings were collected within UC-1 Mud Pit E and one within the shaker debris area for purposes of IDW disposal and mud pit characterization. The location of these borings and the sample intervals was determined from previously completed ESC investigation-related borings. All borings were advanced to their total depth using conventional truck-mounted, direct-push boring equipment.



EXPLANATION

- Fault
- Mud Pit
- Shaker Pads Discharge Area
- Geoprobe Conductivity Boring
- EM31Survey Lines

Note
UC-1 Mud Pits C, D, and E are all CAS 58-09-05

Figure D.3-4
UC-1 Area Location Map
for EM31 Survey and
Geoprobe™ Conductivity Borings

Soil samples collected from individual borings were submitted to on-site and off-site laboratory facilities for analysis. There were 187 samples collected for investigation/characterization of CASs and suspect areas within the UC-1 well area. These samples were submitted to on-site laboratory facilities for the analysis of chromium (total and hexavalent) and combined TPH diesel/motor oil. Three waste characterization and mud pit characterization samples were collected and submitted to off-site laboratories as described in Section 1.2.3 Phase 2 Work Scope.

D.3.3 Summary of Results

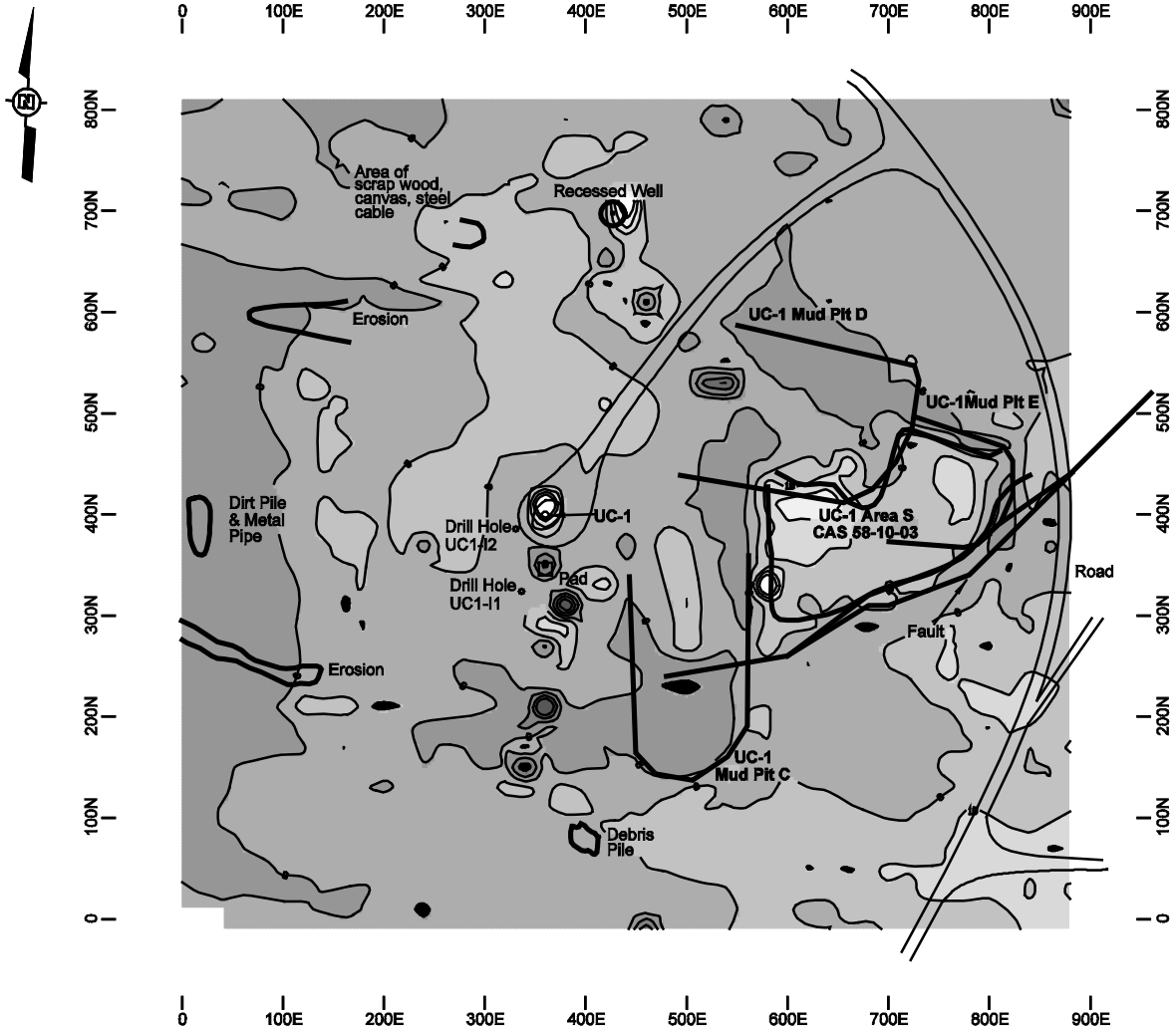
The following sections present the results of geophysical and chemical investigations of the UC-1 area.

D.3.3.1 Geophysical Measurements

The EM31 conductivity and in-phase (metal) data are contoured and presented in Figures D.3-5 and D.3-6. Background terrain conductivities for UC-1 are 6-10 mS/m. Two large conductivity and in-phase (metal) anomalies are the result of the metal casing at surface ground zero and the recessed well-head and metal grate north of surface ground zero.

Two small in-phase (metal) anomalies are located to the south of UC-1. South of ground zero, a line of discontinuous conductivity and in-phase (metal) anomalies indicates the presence of subsurface metallic objects extending southward from surface ground zero (Figures D.3-5 and D.3-6). The remaining portions of the UC-1 grid are relatively free of in-phase (metal) anomalies.

The conductivity data do not indicate the clear presence of remnant mud pits at UC-1. It is possible that the mud pits were cleaned out and backfilled during restoration activities. It is also possible that the features observed on historic aerial photos were not actually mud pits. The feature designated as Mud Pit 1E lies within the observed shaker pad debris area, but does not show a large EM conductivity anomaly, with values only slightly higher than background conductivities. Mud pits 1C and 1D show background conductivities, except for an isolated anomaly due to scrap metal.



12 - 14
10 - 12
8 - 10
6 - 8
4 - 6
2 - 4
0 - 2
Below 0

mS/m

EXPLANATION

- Fault
- Mud Pit
- Shaker Pads Discharge Area
- Conductivity Contours
- EM31Survey Lines

Note
UC-1 Mud Pits C, D, and E are all CAS 58-09-05

SCALE
0 100 200 Feet
0 40 80 Meters

Contour Interval = 2 mS/m

D.3-5
UC-1 Area
EM31 Surface Conductivity Map

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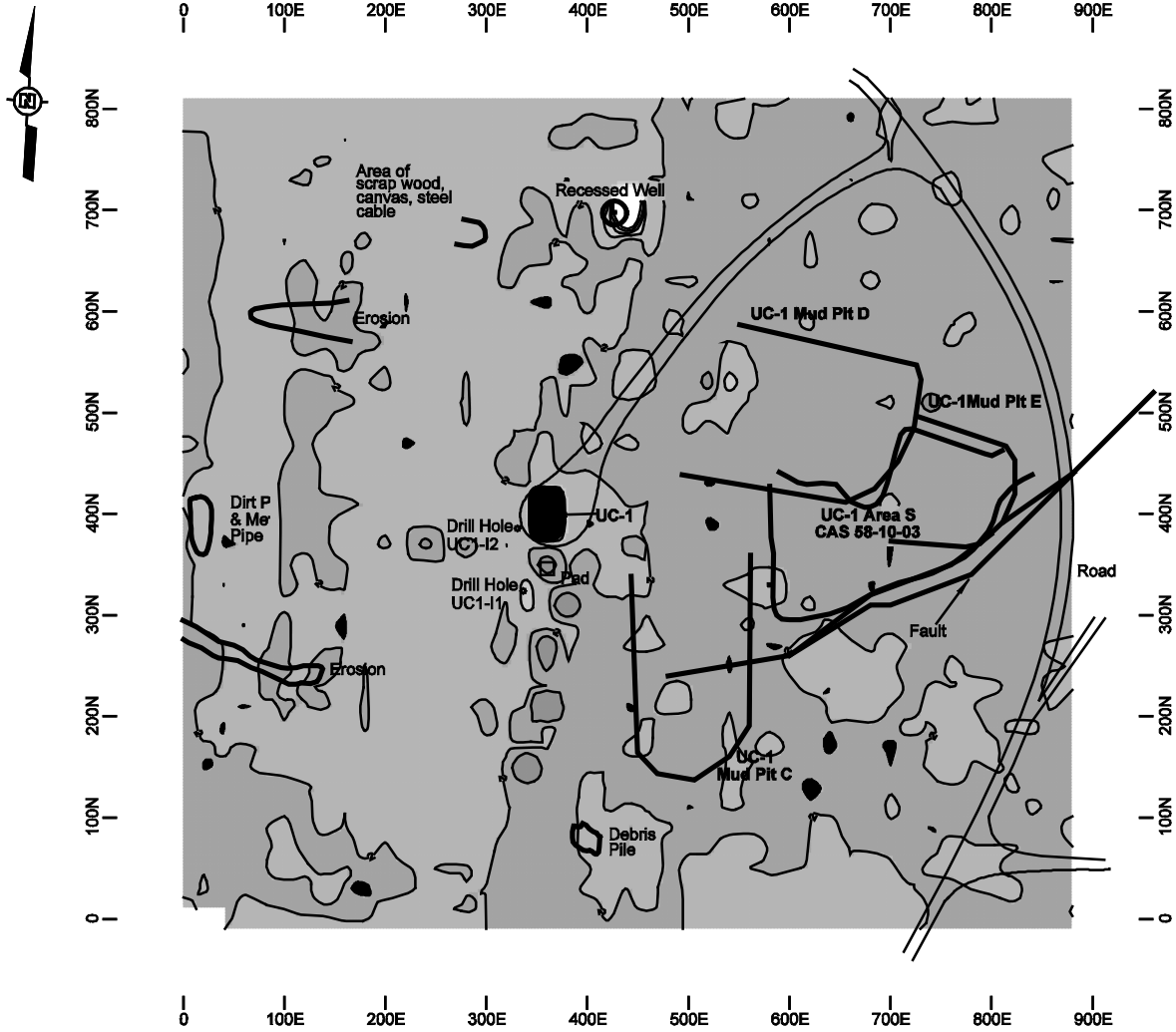
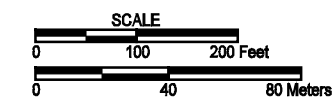
19 MAY 1999





Contour Interval = 2 ppt

8 - 10
6 - 8
4 - 6
2 - 4
0 - 2
Below 0

ppt

EXPLANATION

- Fault
- Mud Pit
- Shaker Pads Discharge Area
- In-phase Contours
- EM31Survey Lines

Note
UC-1 Mud Pits C, D, and E are all CAS 58-09-09-05

Figure D.3-6
UC-1 Area
EM31 In-Phase Metal Survey Map

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19 MAY 1999

Due to the lack of electrical conductive muds to define their locations, the pit locations (1C, 1D, and 1E) were estimated from historical aerial photography and field observations.

D.3.3.2 Chemical Sampling and Analysis

The UC-1 well area contained seven investigation sites. Based on the analytical results from soil samples collected from borings advanced at these sites, three sites (UC-1 Mud Pit A, Mud Pit E, and the Shaker Debris Area) were statistically shown to contain combined TPH diesel/motor oil in excess of the PAL. None of the soil samples collected had hexavalent chromium above the PAL of 390 mg/kg. No radionuclide contaminants were noted in concentrations exceeding background activities at any of the sites investigated within the UC-1 well area.

The following sections describe the extent of the TPH contamination within sites statistically determined to be above the PAL. The final section addresses investigated sites that were determined to have TPH below the PAL.

D.3.3.3 UC-1 Mud Pit A (CAS 58-09-02)

No elevated conductivities are present within the pit (Figure D.3-7), indicating a probable lack of drilling mud. Visual observations and historic aerial photography suggest that this feature may not have been a mud pit and instead is merely an undrained low-lying area which accumulates runoff, leaving a flat desiccated surface. One Geoprobe™ conductivity log (CMP-GC08) was located directly within UC-1 Mud Pit A. Figure D.3-7 compares log CMP-GC08 with log CMP-GC09 just to the north and outside UC-1 Mud Pit A. CMP-GC08 indicated background conductivities similar to those in log CMP-GC09 (averaging 10 mS/m or less) except between 2.90 to 4.27 m (9 to 14 ft) deep where very thin layers periodically increase to a maximum of about 100 mS/m. These thin layers of increased conductivity may be due to natural clays and silts or localized increases in moisture content.

The UC-1 Mud Pit A was statistically determined to be contaminated with combined TPH diesel/motor oil in excess of the PAL. Table D.3-1 provides a summary of the statistical evaluation of chemical sample results. TPH contamination was indicated within the interval/layers 0 - 0.61 m (0 - 2 ft) and 0.61 - 1.22 m (2 - 4 ft). The total thickness of TPH-contaminated material contained within the mud pit is 1.22 m (4 ft).

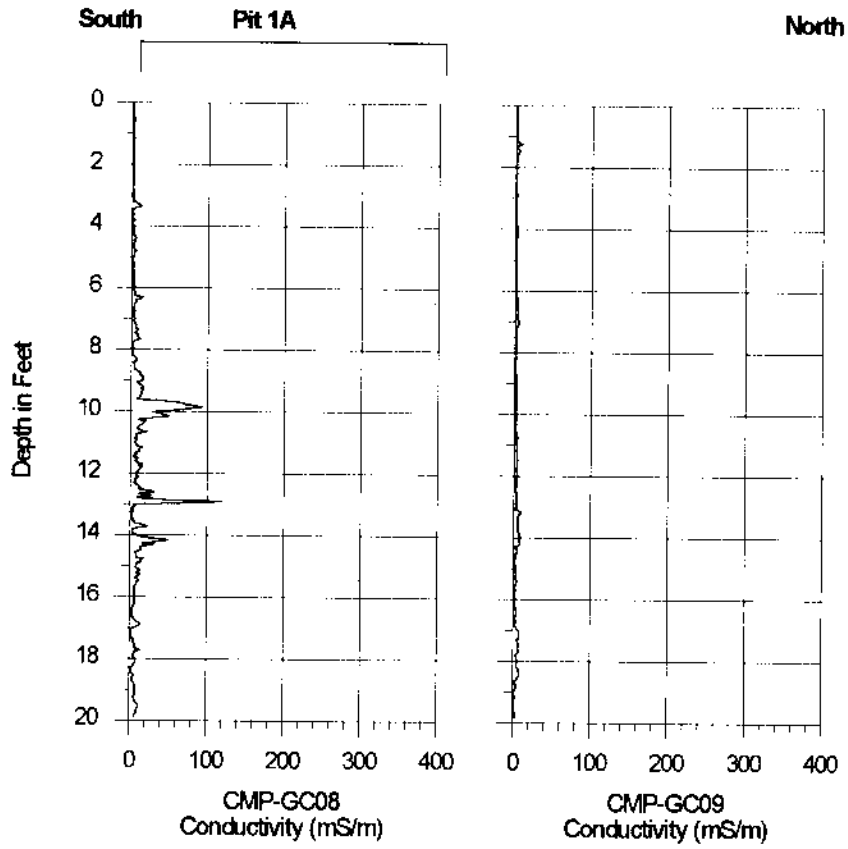


Figure D.3-7
UC-1 Mud Pit A North-South Cross Section
Showing Conductivity Profiles

Table D.3-1
Statistical Analysis for Mud Pit Sampling Central Nevada Test Area - UC-1 Area
(Page 1 of 2)

Area of Investigation	Sampling Interval/Layer	Analyte	Boring Number									Statistically Derived Required No. of Samples	Concentration Above (+) or Below (-) Action Levels	Layer Determination
			u1a1	u1a2	u1a3	u1a4	u1a5	u1a6	u1a7	u1a8	u1a9	(Nd)	(<>+U-AL)	
UC-1 Mud Pit A	0-2'	TPH	247.6	710	13.4	18.9	393	313	19.5	21.3	14.2	5	1090	contaminated
"	2-4'	TPH	20	256	13.6	13.8	18	20.6	16.5	13.6	14.1	127	401	contaminated
"	4-6'	TPH	15	33	15	13.5	76	18.6	13.6	13.5	13.8	1	-48	noncontaminated
"	6-8'	TPH	13.6	13.3	R	R	R	NS	13.4	NS	13.7	1	-86	noncontaminated
"	8-10'	TPH	H	H	R	R	R	NS	NS	NS	NS	NA	NA	NA
"	0-2'	CR+6	93.3	79.3	50	50	50	50	50	50	50	1	-282	noncontaminated
"	2-4'	CR+6	50	50	50	50	50	50	50	50	50	0	-340	noncontaminated
"	4-6'	CR+6	50	50	50	50	50	50	50	50	50	0	-340	noncontaminated
"	6-8'	CR+6	50	50	R	R	R	NS	H	NS	50	0	-340	noncontaminated
	8-10'	CR+6	H	H	R	R	R	NS	NS	NS	R	NA	NA	NA
			u1b1	u1b2	u1b3	u1b4	u1b5	u1b6						
UC-1 Mud Pit B	0-2'	TPH	23.6	15.8	42.5	21.3	24.4	19.2				1	-70	noncontaminated
"	2-4'	TPH	31.4	16.2	19.6	14.5	11.9	R				1	-77	noncontaminated
"	4-6'	TPH	13.4	18	20.5	14.6	R	R				1	-81	noncontaminated
"	6-8'	TPH	R	H	H	H	R	R				NA	NA	NA
"	8-10'	TPH	R	H	H	R	R	R				NA	NA	NA
"	10-12'	TPH	R	H	H	R	R	R				NA	NA	NA
"	0-2'	CR+6	50	50	50	50	50	50				0	-340	noncontaminated
"	2-4'	CR+6	50	50	50	50	50	R				0	-340	noncontaminated
"	4-6'	CR+6	50	50	50	64	R	R				1	-331	noncontaminated
"	6-8'	CR+6	R	H	H	R	R	R				NA	NA	NA
"	8-10'	CR+6	R	H	H	R	R	R				NA	NA	NA
"	10-12'	CR+6	R	H	H	R	R	R				NA	NA	NA
			u1c1	u1c2	u1c3	u1c4	u1c5	u1c6						
UC-1 Mud Pit C	0-2'	TPH	13.6	13.6	25.2	13.7	13.6	13.3				1	-82	noncontaminated
"	2-4'	TPH	13.7	13.3	20.9	13.6	14.1	13.4				1	-83	noncontaminated
"	4-6'	TPH	18.3	22.3	25.4	13.7	15.5	13.3				1	-79	noncontaminated
"	6-8'	TPH	13.7	32.1	11.5	21.6	16.3	13.3				1	-77	noncontaminated
"	8-10'	TPH	11.9	14	14.8	21.4	27.9	13.3				1	-79	noncontaminated
"	10-12'	TPH	H	H	R	H	H	H				NA	NA	NA
"	0-2'	CR+6	50	50	50	50	50	50				0	-340	noncontaminated
"	2-4'	CR+6	50	50	50	50	50	50				0	-340	noncontaminated
"	4-6'	CR+6	50	50	50	50	50	50				0	-340	noncontaminated
"	6-8'	CR+6	50	50	64	50	50	50				1	-334	noncontaminated
"	8-10'	CR+6	64	50	50	50	50	50				1	-334	noncontaminated
"	10-12'	CR+6	H	H	H	50	H	H				NA	NA	NA
			u1d1	u1d2	u1d3	u1d4	u1d5	u1d6						
UC-1 Mud Pit D	0-2'	TPH	13.4	13.6	13.3	13.3	28.2	17.2				1	-80	noncontaminated
"	2-4'	TPH	13.7	13.6	13.4	13.4	13.9	13.7				1	-86	noncontaminated
"	4-6'	TPH	21.1	16.9	11.9	13.4	13.5	13.6				1	-83	noncontaminated
"	6-8'	TPH	12.2	19.2	24.4	13.6	13.7	13.3				1	-81	noncontaminated
"	8-10'	TPH	11.8	12.3	11.6	14.4	13.8	13.4				1	-86	noncontaminated
"	10-12'	TPH	H	R H	H	R H	R H	H				NA	NA	NA
"	0-2'	Cr+6	50	50	50	50	50	50				0	-340	noncontaminated
"	2-4'	Cr+6	50	50	50	50	50	50				0	-340	noncontaminated
"	4-6'	Cr+6	50	50	50	50	50	50				0	-340	noncontaminated
"	6-8'	Cr+6	50	50	50	50	50	50				0	-340	noncontaminated
"	8-10'	Cr+6	50	50	50	50	50	50				0	-340	noncontaminated
"	10-12'	Cr+6	H	H	H	H	H	H				NA	NA	NA

Table D.3-1
Statistical Analysis for Mud Pit Sampling Central Nevada Test Area - UC-1 Area
(Page 2 of 2)

Area of Investigation	Sampling Interval/Layer	Analyte	Boring Number									Statistically Derived Required No. of Samples	Concentration Above (+) or Below (-) Action Levels	Layer Determination
			u1e1	u1e2	u1e3	u1e4	u1e5	u1e6	u1e7	u1e8				
UC-1 Mud Pit E	0-2'	TPH	272	605	632	17.6	51.9	50.1	NS	19.2		19	342	contaminated
"	2-4'	TPH	15.1	587	323	22.9	21.1	37.8	NS	17.8		81	211	contaminated
"	4-6'	TPH	15.5	13.1	12.7	11.9	12.6	11.5	NS	15.0		1	-86	noncontaminated
"	10-12'	TPH	NS	NS	NS	NS	NS	NS	13.9	NS		NA	NA	NA
"	0-2'	Cr+6	50	80.2	50	64	50	50	50	50		1	-325	noncontaminated
"	2-4'	Cr+6	50	68	50	50	50	50	NS	50		1	-333	noncontaminated
"	4-6'	Cr+6	50	50	64	50	50	50	NS	50		1	-344	noncontaminated
"	10-12'	Cr+6	NS	NS	NS	NS	NS	NS	50	NS		NA	NA	NA
			u1s1	u1s2	u1s3	u1s4	u1s5	u1s6	u1s7					
UC-1 Shaker Debris Area	0-2'	TPH	4500	2146	1640	203.4	16.6	41.5	24.5			6	3485	contaminated
"	2-4'	TPH	2223	16.6	14.1	16.5	13.6	13.4	13.4			37	1371	contaminated
"	4-6'	TPH	75.2	23.9	15.6	14.1	20	14.1	13.2			2	-44	noncontaminated
"	6-8'	TPH	H	H	H	H	NS	NS	NS			NA	NA	NA
"	0-2'	Cr+6	82	102	87.7	50	50	50	50			1	-292	noncontaminated
"	2-4'	Cr+6	58.4	50	50	50	50	64	50			1	-334	noncontaminated
"	4-6'	Cr+6	50	50	50	50	50	50	50			0	-340	noncontaminated
"	6-8'	Cr+6	H	H	H	H	NS	NS	NS			NA	NA	NA
			u1y1	u1y2	u1y3	u1y4	u1y5							
UC-1 Y area	0-2'	TPH	197.2	82.7	21.1	77.3	51.9					151	32	contaminated
"	2-4'	TPH	13.5	14	18.5	13.6	13.7					1	-84	noncontaminated
"	4-6'	TPH	13.4	13.6	13.4	13.6	13.7					1	-86	noncontaminated
"	6-8'	TPH	13.4	13.4	NS	NS	NS					NA	NA	NA
"	0-2'	Cr+6	50	50	50	50	50					NA	NA	NA
"	2-4'	Cr+6	50	50	50	50	50					NA	NA	NA
"	4-6'	Cr+6	50	50	50	50	50					NA	NA	NA
"	6-8'	Cr+6	50	50	NS	NS	NS					NA	NA	NA
			u1x1	u1x2	u1x3	u1x4								
UC-1 X area	0-2'	TPH	13.1	13.1	13.1	13.1						NA	NA	NA
"	0-2'	Cr+6	50	50	50	50						NA	NA	NA
			u1e8											
UC-1 Shaker Debris Breach	0-2'	TPH	19.2									NA	NA	NA
"	2-4'	TPH	17.8									NA	NA	NA
"	4-6'	TPH	15									NA	NA	NA
	6-8'	TPH	NS									NA	NA	NA
	0-2'	Cr+6	50									NA	NA	NA
	2-4'	Cr+6	50									NA	NA	NA
	4-6'	Cr+6	50									NA	NA	NA
	6-8'	Cr+6	NS									NA	NA	NA

NOTES:

All values are reported as milligrams/kilogram (mg/kg
Nd = number of samples needed to make decision
<> = mean value of all measurements in given lay
U = upper confidence limit
AL = action level (100mg/kg TPH & 390 mg/kg Hex Cr
If <>+U-AL > 0 then layer is above Action Level But if <0 then layer is below Action lev
TPH = sum of diesel and motor oil component
NA = Not analyzed
NS = Sample not collected
R = No sample collected due to refusal conditions within borin
H = Sample collected and held by laboratory and not analyze
Cr+6 = Hexavalent chromium

u1xx — Boring and associated samples included in statistical calculatio

Nine borings were advanced within the UC-1 Mud Pit A Site to investigate potential contamination. Borings were advanced to total depths between 1.83 and 3.05 m (6 and 10 ft). The highest combined TPH diesel/motor oil value reported from any of the 0.61-m (2-ft) sample intervals collected was 710 mg/kg. This concentration was reported for a soil sample collected in boring U1A2 within the interval 0 - 0.61 m (0 - 2 ft). No contamination exceeding the TPH PAL was recorded below a depth of 1.22 m (4 ft). Analytical results for UC-1 Mud Pit A, including QA/QC samples, are provided in Attachment F. Figure D.2-4 provides the location of individual borings and identifies those borings with TPH concentrations in excess of the PAL. Figure D.3-8 displays TPH data with respect to depth at all of the UC-1 Mud Pit A sampling locations.

Soil boring logs prepared by site geologists indicate the TPH contaminated intervals/layers 0 - 0.61 m (0 - 2 ft) and 0.61 - 1.22 m (2 - 4 ft) within UC-1 Mud Pit A occur within a horizon of drill cuttings and drilling mud. The drill cuttings and mud were mixed and very dry which is why the layer was not identified using the conductivity probe. Uncontaminated materials lying below layers of contamination within the interval of 1.22 - 3.05 m (4 - 10 ft) are comprised of native soils consisting of silty sand with some gravels. Soil boring logs and cross-sectional views for soil borings completed within the UC-1 Mud Pit A Site are provided in Attachment J.

Material considered to be TPH-contaminated covers a surface area measuring 18.29 m x 24.38 m (60 ft x 80 ft) and extends to a depth of 1.22 m (4 ft). Based on these dimensions the total volume of contaminated material contained in the UC-1 Mud Pit A is approximately 544 m^3 (711 yd^3).

D.3.3.4 UC-1 Mud Pit E (CAS 58-09-05)

A slight increase in EM31 conductivity in the vicinity of UC-1 Mud Pit E may correlate with visible shaker pad debris on the surface. The shaker pad was on the berm above Mud Pit E and the cuttings and drill mud flowed down into the pit. One Geoprobe™ conductivity profile (UC1-GC10) is located at the edge of UC-1 Mud Pit E. Figure D.3-9 compares profile UC1-GC10 within Pit 1E and profile UC1-GC09 outside to the east of the pit. Profile UC1-GC10 clearly indicates the presence of high conductivity material (up to 900 mS/m) from 0 - 0.91 m (0 to 3 ft) and 3.2 to 3.66 m (10 to 12 ft) deep. All other depths in profile UC1-GC10 indicate background conductivities similar to profile UC1-GC09.

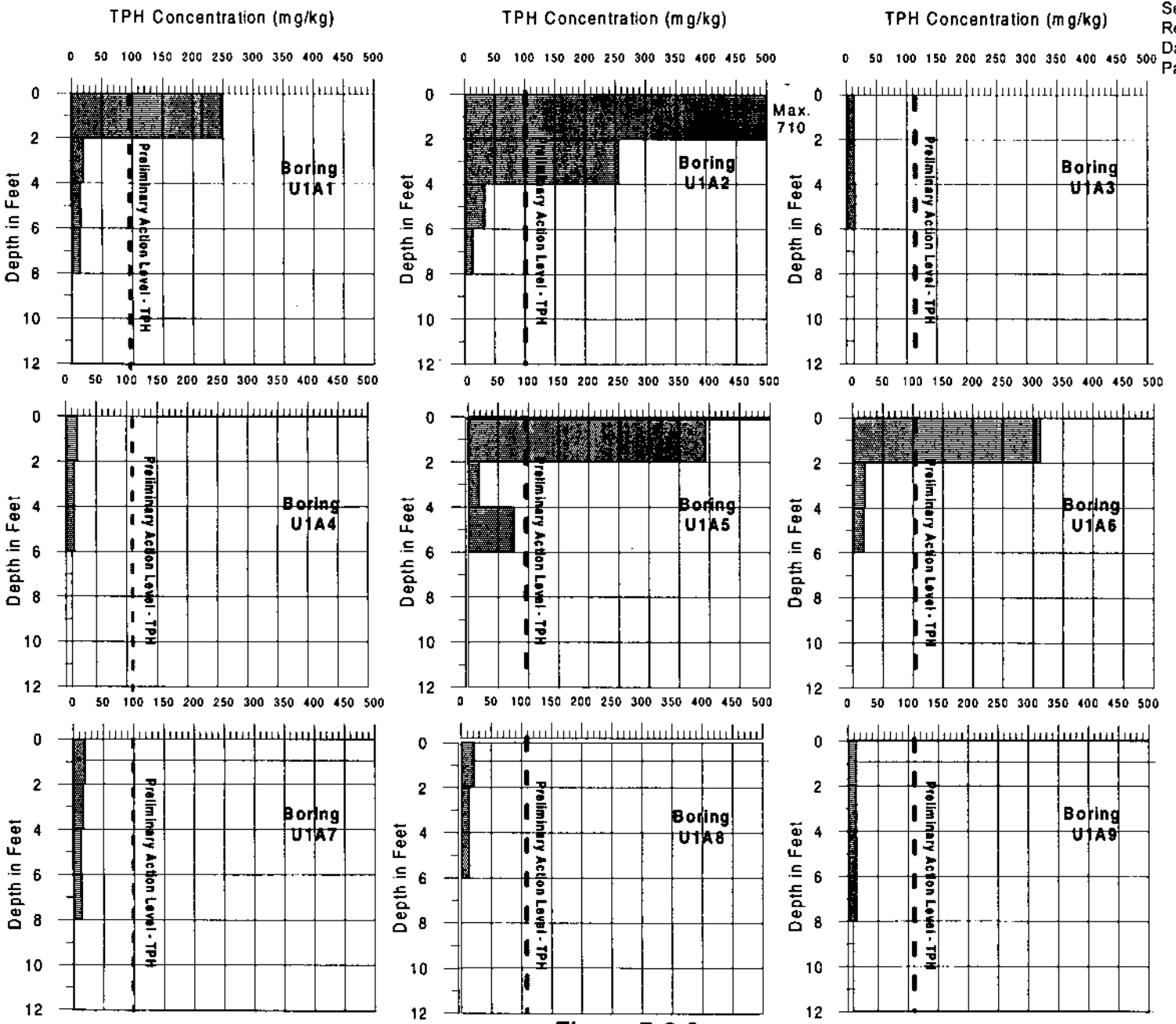


Figure D.3-8
UC-1 Mud Pit A TPH Concentrations from Chemical Sampling

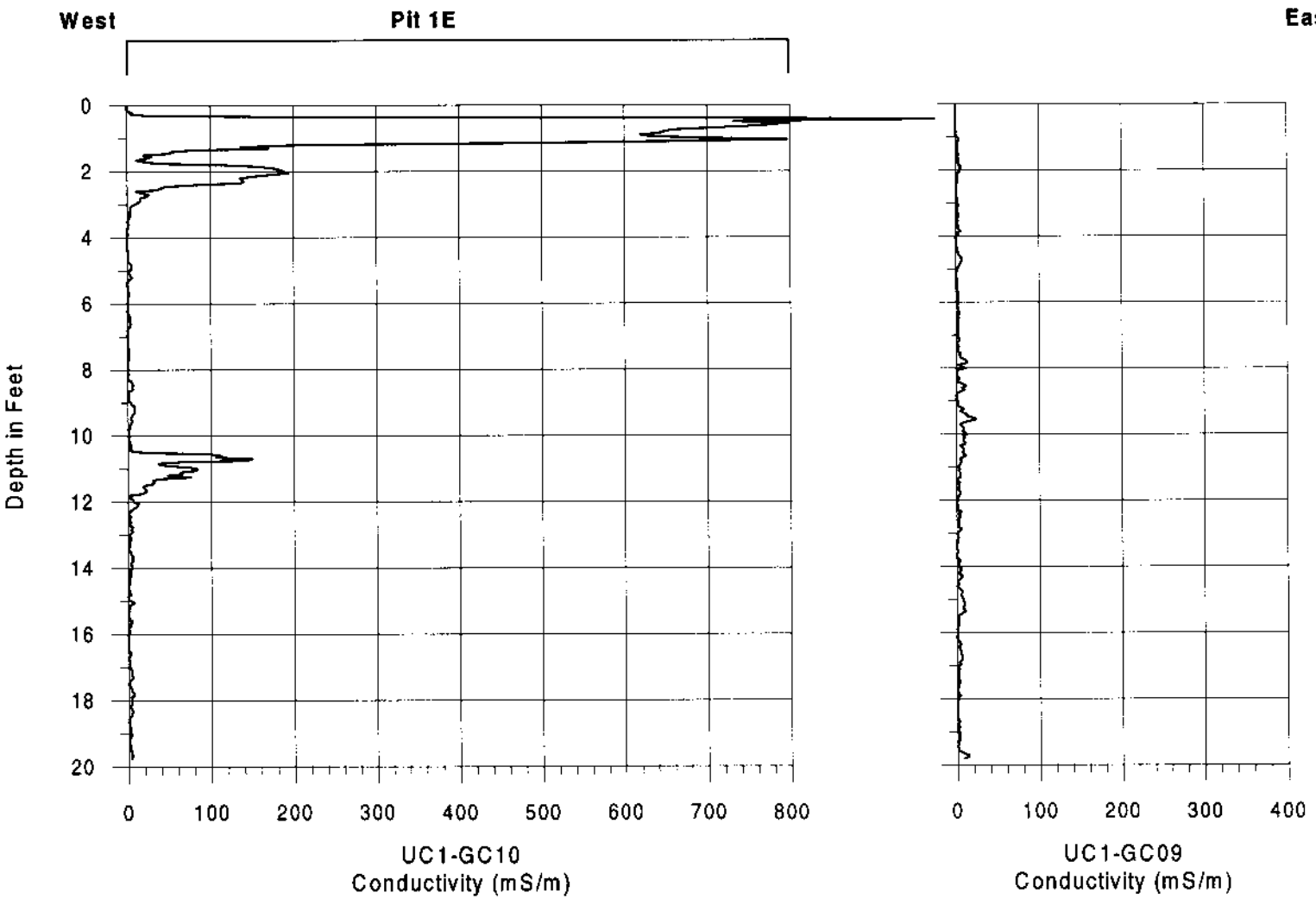


Figure D.3-9
UC-1 Mud Pit E East-West Cross Section
Showing Conductivity Profiles

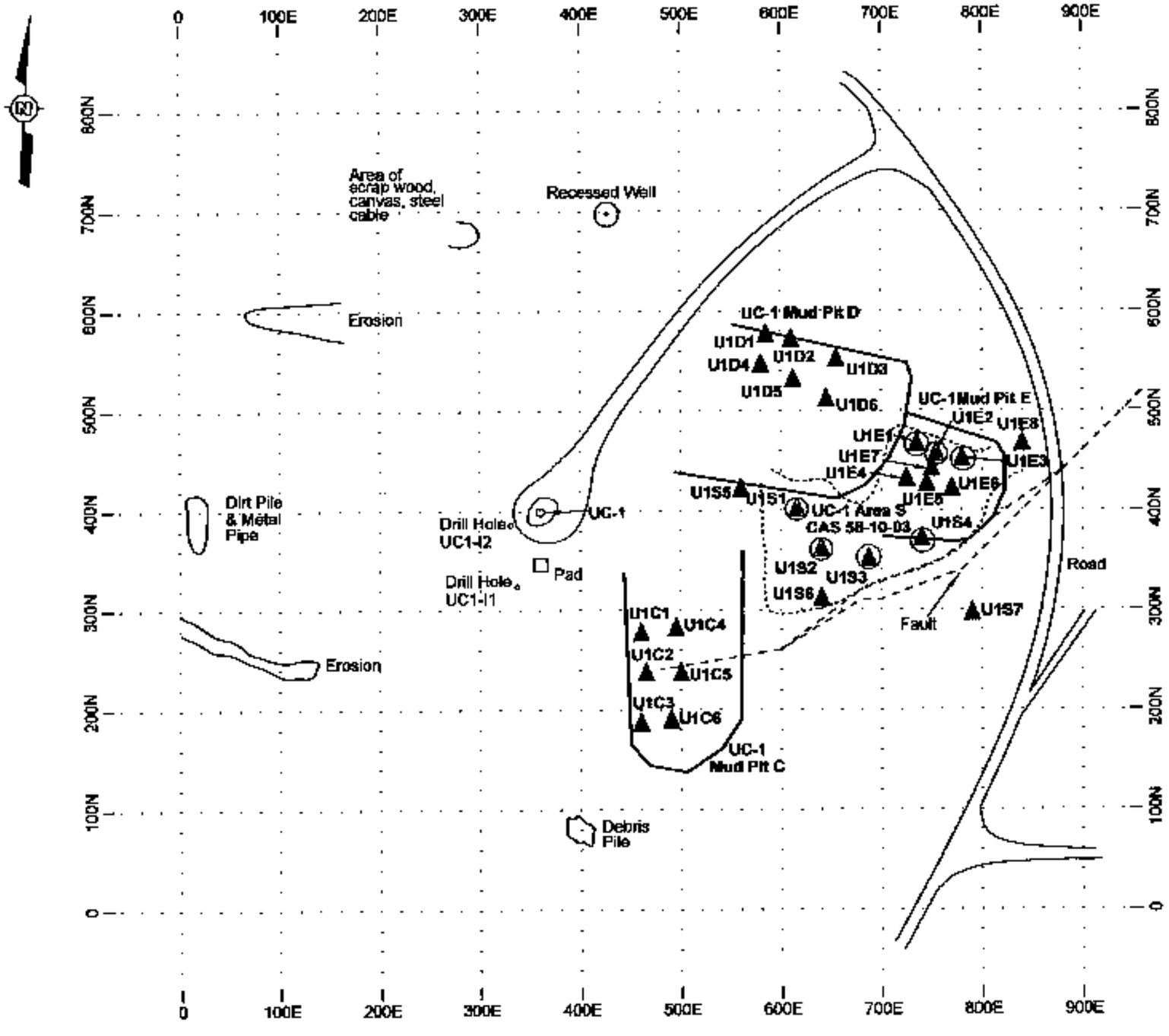
The UC-1 Mud Pit E was statistically determined to contain TPH in excess of the PAL. Table D.3-1 provides a summary of the statistical analysis. Total petroleum hydrocarbon contamination was indicated in soil samples within the interval/layers 0 - 0.61 m (0 - 2 ft) and 0.61 - 1.22 m (2 - 4 ft). The total thickness of TPH-contaminated material within the mud pit is 1.22 m (4 ft).

Seven soil borings were advanced within the UC-1 Mud Pit E Site to investigate the nature and extent of potential contamination. A single boring U1E8 was advanced just outside the only breach in the berm around Mud Pit 1E. All of the soil borings were advanced to a total depth of 3.66 m (12 ft). Composite soil samples were collected from the borings in 0.61-m (2-ft) intervals.

Three of the borings advanced within the site encountered TPH contamination in excess of the PAL. Borings U1E2 and U1E3 encountered TPH contamination over the layer/intervals 0 - 0.61 m (0 - 2 ft) and 0.61 - 1.22 m (2 - 4 ft). Boring U1E1 encountered contamination in excess of the PAL only over the interval/layer 0 - 0.61 m (0 - 2 ft). The U1E8 boring showed no sample with TPH above the PAL to a depth of 1.83 m (6 ft). Analytical results for samples including QA/QC samples are provided in Attachment F. Figure D.3-10 provides the location of borings and identifies those borings in excess of the PALs. Figure D.3-11 displays TPH data with respect to depth at all of the Pit 1E sampling locations.

Soil descriptions prepared by the site geologists indicated that TPH-contaminated intervals from 0 - 1.22 m (0 - 4 ft) occurred within mixed soils with some residual drilling muds. Underlying materials within the 1.22 - 3.66 m (4 - 12 ft) interval were comprised of native soils composed of sands and silts with some gravel. Soil boring logs and cross-sectional views of the borings within Mud Pit E are provided in Attachment J.

The volume of contaminated soil within this site includes an estimated surface area measuring 23.77 m (78 ft) in length and 21.95 m (72 ft) in width, extending to a depth of 1.22 m (4 ft). The estimated total volume of contaminated material contained within UC-1 Mud Pit E is 636 m^3 (832 yd^3).



EXPLANATION

- Fault
- Mud Pit
- Shaker Pads Discharge Area
- Soil Boring Sampling Locations
- Soil Boring Locations with Samples Exceeding 100 mg/kg TPH
- Waste/Mud Pit Characterization Sampling Location

Note
UC-1 Mud Pits C, D, and E are all CAS 58-09-05

Figure D.3-10
UC-1 Area Location Map
Showing Soil Borings

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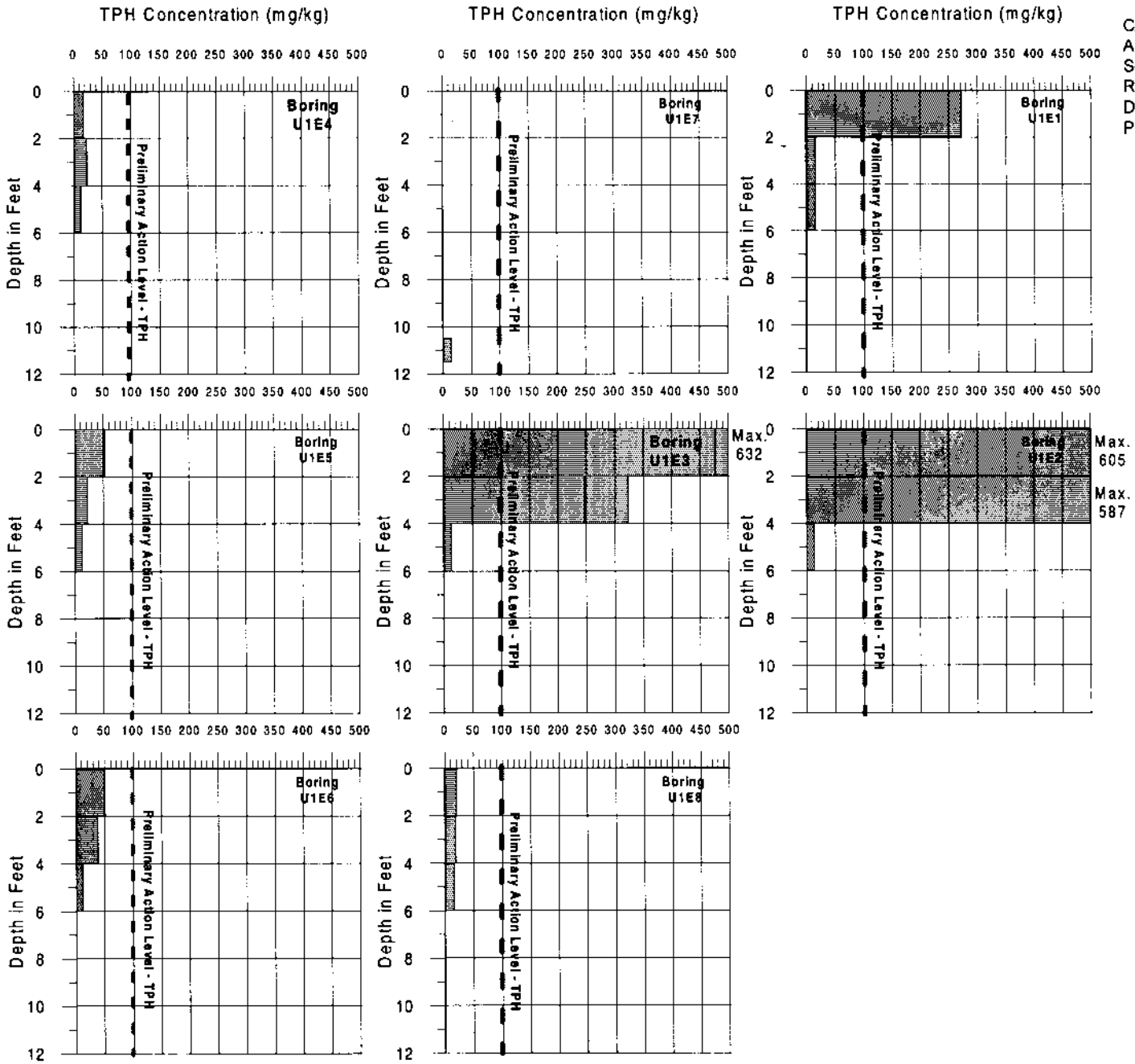

Figure D.3-11
UC-1 Mud Pit E TPH Concentrations from Chemical Sampling

D.3.3.5 UC-1 Shaker Debris Area (CAS 58-10-02)

An area with slightly elevated conductivity values 2-4 mS/m higher than background is centered east of surface ground zero. The anomaly follows the observed location of light-colored material that may be shaker pad debris. While no shaker pad was previously identified at this site, the debris observed at the surface is similar to that observed at the UC-3 and UC-4 shaker pad areas. The anomaly is bounded by a fault scarp to the south and extends to the east along the natural drainage.

One Geoprobe™ conductivity profile (UC1-GC12) is located within the shaker pad debris. Figure D.3-12 compares profile UC1-GC12 with profiles UC1-GC11 and UC1-GC14 to the north and south, respectively. All three profiles indicate background conductivities with only subtle increases. These subtle increases are likely due to variations in natural silts and clays or moisture content of the soils.

The UC-1 shaker debris area was determined statistically to be contaminated with TPH in excess of preliminary site action levels. The TPH contamination was present in the 0.61-m (2-ft) depth intervals/layers of 0 - 0.61 m (0 - 2 ft) and 0.61 - 1.22 m (2 - 4 ft). A combined thickness totaling 1.22 m (4 ft) of TPH-contaminated material exists within the UC-1 shaker debris area.

Seven borings were advanced within the site of the UC-1 Shaker Debris. Soil borings were advanced to depths of up to 2.44 m (8 ft), and composite soil samples were collected on 0.61-m (2-ft) intervals. All of the borings were located within the visible drill cuttings in the shaker area. Four soil borings (U1S1, U1S2, U1S3, and U1S4) encountered TPH contamination exceeding the PAL within the sample intervals 0 - 0.61 m (0 - 2 ft) and 0.61 - 1.22 m (2 - 4 ft).

The highest combined TPH concentration was 4,500 mg/kg for the interval 0 - 0.61 m (0 - 2 ft) within boring U1S1. Three other borings (U1S5, U1S6, and U1S7) advanced to determine the extent of contamination within the shaker area did not encounter TPH diesel/motor oil concentration in excess of the PAL. Attachment F provides the analytical results for the UC-1 Shaker Debris Area samples including the results for associated QA/QC samples. Figure D.3-8 provides a map showing the location of borings and identifies those borings with samples in excess of the PAL. Figure D.3-13 displays TPH data with respect to depth at all of the UC-1 shaker pad sampling locations.

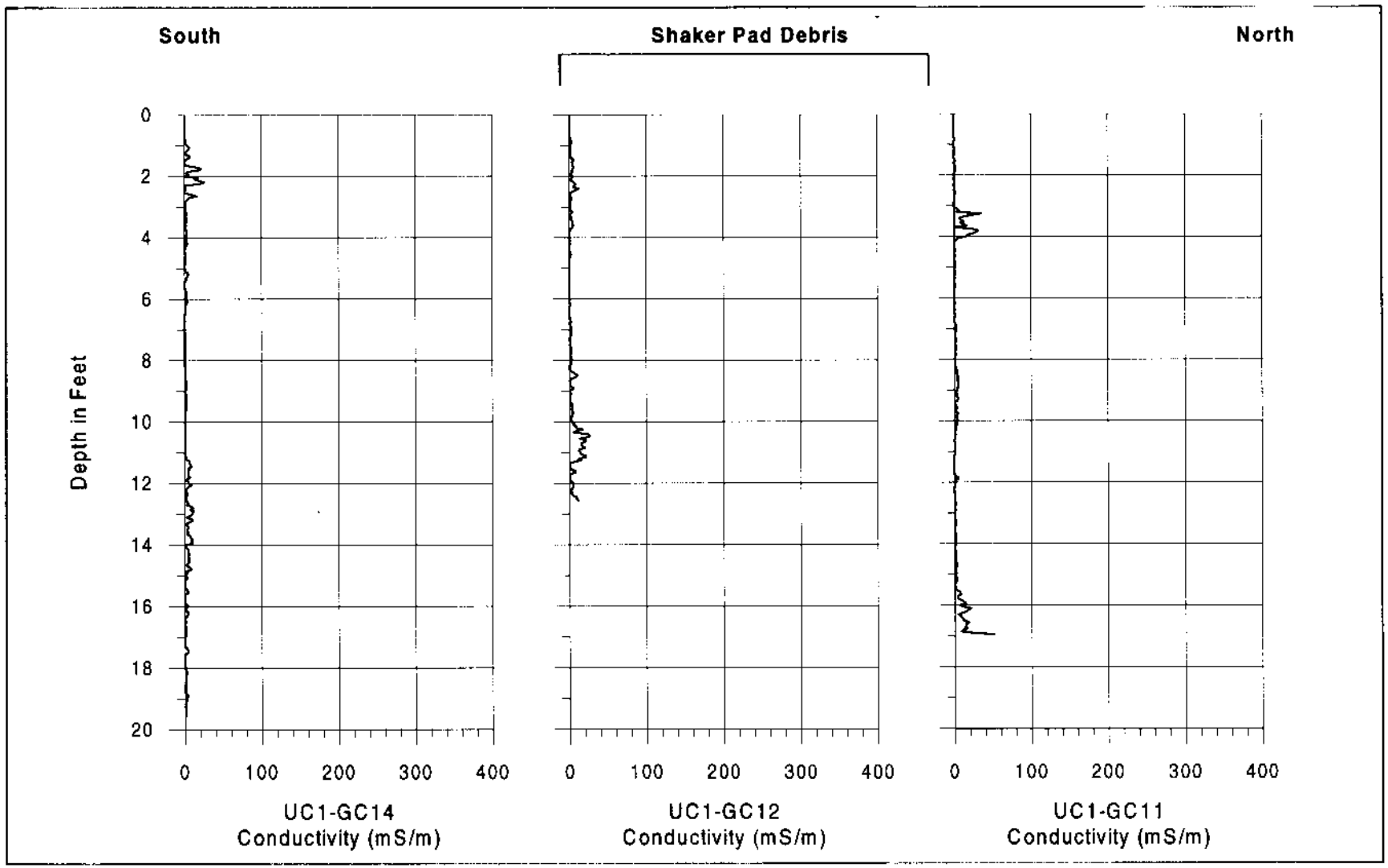

Figure D.3-12
UC-1 Shaker Pad Debris Area
North-South Cross Section Showing Conductivity Profiles

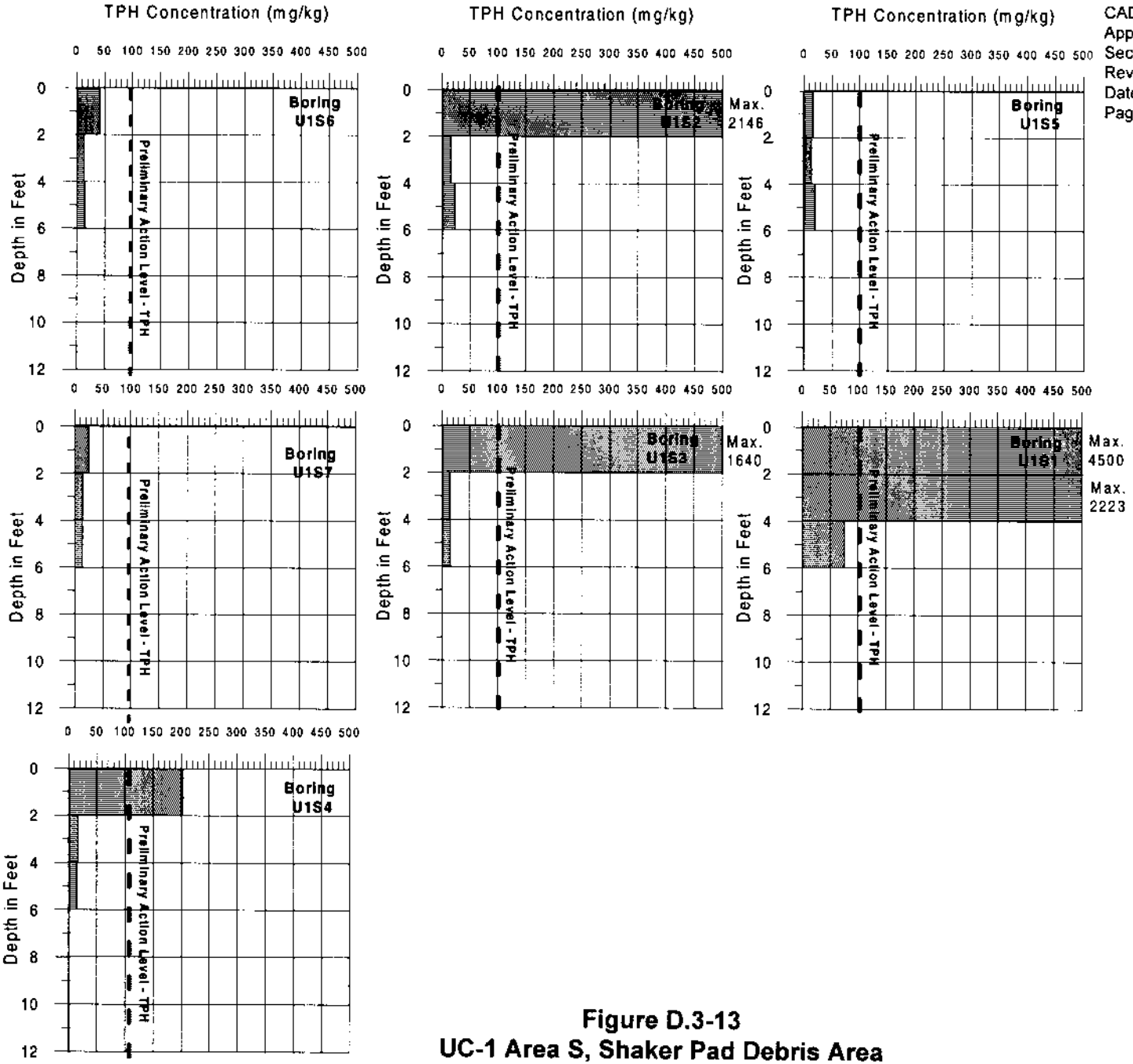

Figure D.3-13
UC-1 Area S, Shaker Pad Debris Area
TPH Concentrations from Chemical Sampling

Soil boring logs prepared by site geologists indicated the contaminated intervals 0 - 1.22 m (0 - 4 ft) occurred in a horizon of moist to dry drill cuttings mixed with some drilling mud. Uncontaminated materials underlying the contaminated layers within the interval of 1.22 - 2.44 m (4 - 8 ft) consisted of native soils composed of silty sands with some gravel. Soil boring logs and cross-sectional views of the completed borings are provided in Attachment J.

The volume of TPH-contaminated material within the UC-1 Shaker Debris site occurs over an irregular shaped area approximately 48.77 m (160 ft) in length and 18.29 m (60 ft) in width with a thickness of 1.22 m (4 ft). The volume of contaminated material within the UC-1 Shaker Debris Area is estimated at approximately 1,088 m^3 (1,422 yd^3).

D.3.3.6 UC-1 Area Y (CAS 58-44-06)

The UC-1 Area Y was identified during the course of the 1997 investigations of sites previously identified within the UC-1 well area. Area Y is a graded area located approximately 1,093 m (3,587 ft) south of the UC-1 emplacement well (see Figure D.3-3).

Five borings were advanced in the graded area of the UC-1 site. Boring U1Y1 encountered TPH concentrations of 197.2 mg/kg within the depth interval 0 - 0.61 m (0 - 2 ft). No other borings had TPH diesel/motor oil concentrations in excess of the PAL. Characterization of this site is essentially complete. The area north and east of boring U1Y1 is topographically higher than the U1Y graded area and the boundary was interpolated based on decreasing concentrations in downgradient borings. Given the low concentration of TPH/motor oil contamination in boring U1Y1, it is unlikely that higher concentrations exist upgradient. Figure D.3-14 displays the TPH data with respect to depth at all the UC-1 Area Y sampling locations.

The volume of TPH-contaminated material within the UC-1 Y site is estimated to occur over an irregular shaped area approximately 6.10 m (20 ft) in length and 6.10 m (20 ft) in width with a thickness of 0.61 m (2 ft) around boring U1Y1. The volume of contaminated material within UC-1 area Y is estimated at approximately 23 m^3 (30 yd^3).

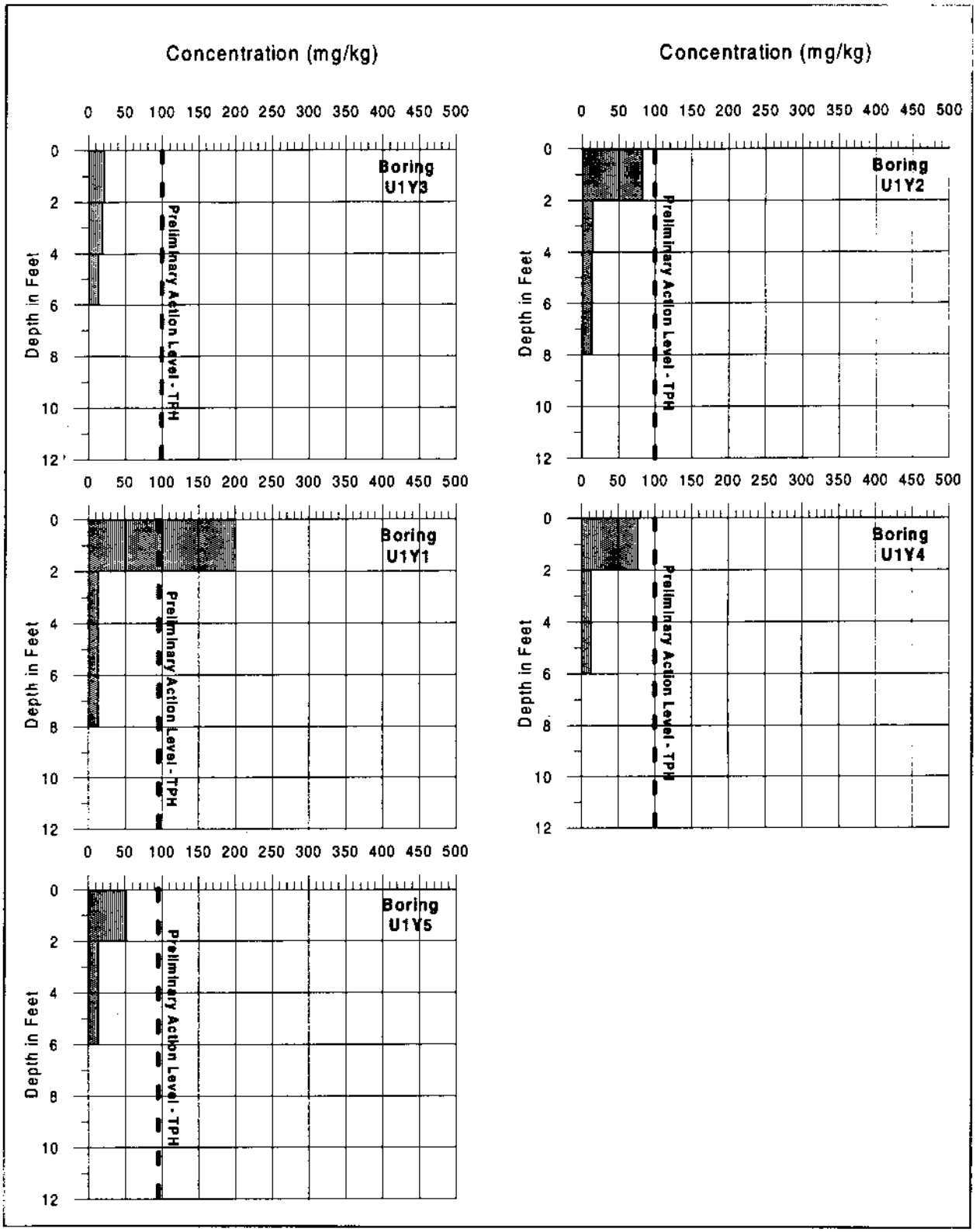

Figure D.3-14
UC-1 Area Y TPH Concentrations from Chemical Sampling

D.3.3.7 UC-1 Well Area Uncontaminated Sites of Investigation

A total of five of the seven sites investigated were found not to have concentrations of COCs above the PAL. These sites are:

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- UC-1 Mud Pit B (CAS #58-09-04)
- UC-1 Mud Pit C (CAS #58-09-05)
- UC-1 Mud Pit D (CAS #58-09-05)
- UC-1 Area X Mud/Grout Piles (58-44-01, 58-44-02, 58-44-05)

Pit B was sampled to refusal at six locations, and no TPH concentration was found above the PAL and the statistical test for the requisite number of samples to make a reliable decision was met in all cases. At locations U1B1 through U1B4 refusal limited sampling to 0 - 1.83 m (0 to 6 ft), while at locations U1B5 and U1B6 sampling was limited to only the top 0.61 m (2 ft). Pits C and D were sampled at six locations from 0 to 3.05 m (0 to 10 ft), and no sample had TPH concentrations above the PAL. For each layer, the number of samples required for a decision was well below the six actually taken. Various mud/grout piles ("Area X") were sampled from 0 to 0.61 m (0 to 2 ft), and all TPH concentrations were well below PAL.

The locations of these sites and the respective sampling locations are shown in Figure D.3-8. Analytical results for these sites including the QA/QC samples are provided in Attachment F. The statistical analysis of chemical samples from these areas is shown in Table D.3-1.

Soil boring logs and cross-sectional views of the soil borings are provided in Attachment J.

D.4.0 UC-4 Well Area Investigations

The UC-4 well area is the northern-most of the drilling sites on the CNTA project area. The UC-4 area was the location of several well drilling and completion operations, most notably the UC-4 emplacement well. The UC-4 well was drilled and completed for use as an emplacement hole for an underground nuclear device; however, a nuclear device was never emplaced in the borehole. Several other wells were drilled and completed proximal to the UC-4 well and served as exploratory and hydrologic test wells. Most of these wells were plugged and abandoned in accordance with applicable requirements when the site was decommissioned (AEC, 1973a). The wells which were not plugged were turned over to the BLM for their use (AEC, 1973a). No further work is planned on these wells. Suspected areas of surface contamination were related to operations associated with the drilling and completion of these wells and included mud pits, shaker debris areas, and run-off areas near the UC-4 well site. Figure D.4-1 provides a map showing the location of the areas identified for investigation. Two CASs were identified in the CAIP for the UC-4 well area. In addition to these CASs, three additional sites were investigated based on proximity to areas of suspected or known contamination and visual observations that suggested potential for surface contamination.

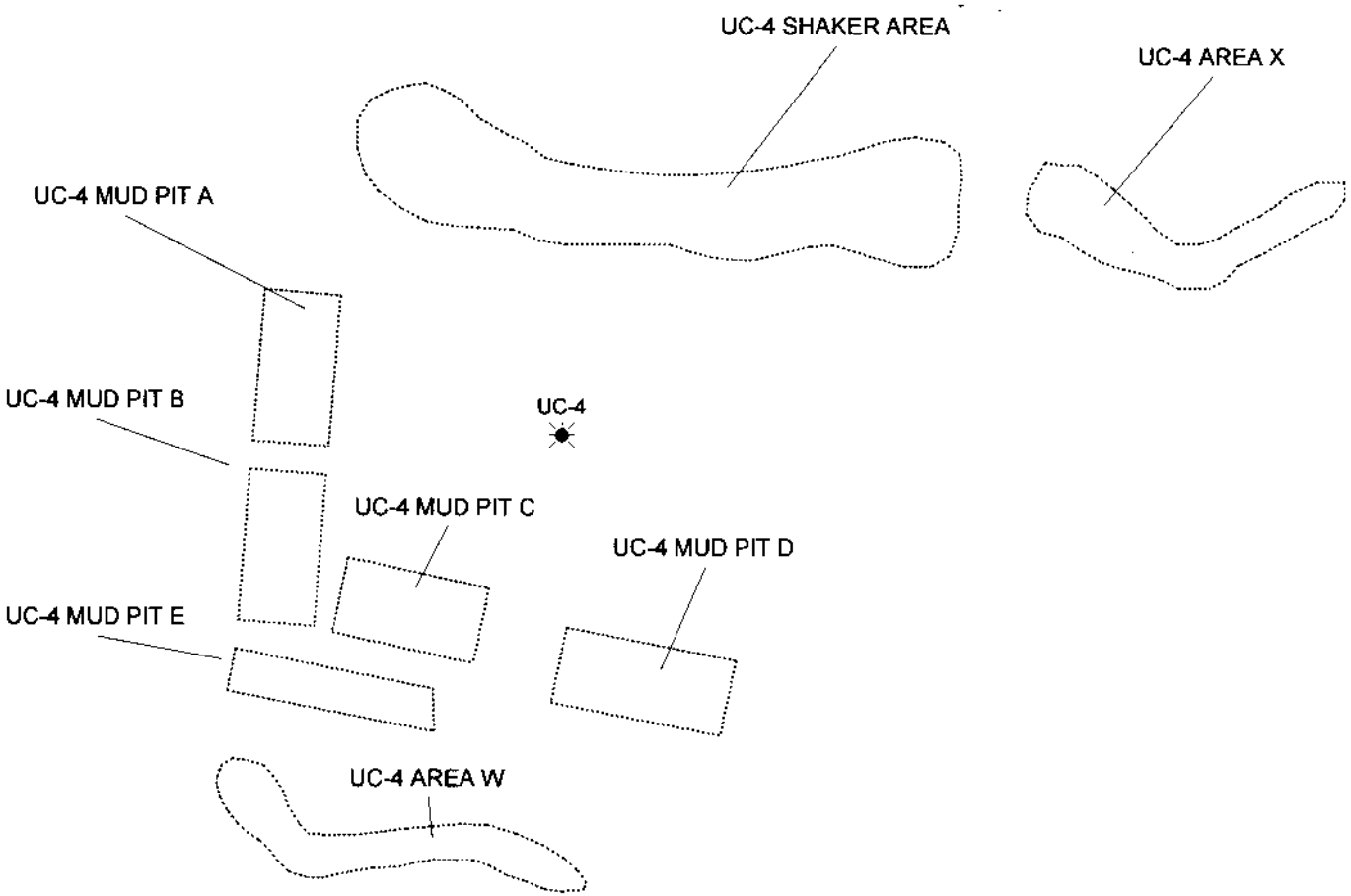
D.4.1 Purpose

Investigations within the UC-4 area were conducted to evaluate the COC (TPH diesel/motor oil and hexavalent chromium) within CAS 58-09-03 and CAS 58-10-02 and three additional suspected sites related to drilling and well completion operations. The vertical and lateral extent of identified contamination would be defined for each of the sites.

D.4.2 Scope of Work

Surface investigation and surface sampling of the two CASs and three additional suspected sites were conducted from May 13 - 21, 1997, and June 2 through 4, 1997. Eleven days were spent advancing soil borings and collecting soil samples from sites within the UC-4 well area. Investigated sites as listed below included mud pits, mud pit breach areas, out-flow areas, and shaker debris areas.

- UC-4 Mud Pits A through E (CAS 58-09-03)
- UC-4 Area S Shaker Pad Area (CAS 58-10-02)
- UC-4 Area W, Southern Drainage Channel (CAS 58-10-04)



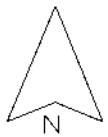
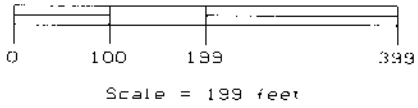


Figure D.4-1
UC-4 Area Location Map



- UC-4 Area X, Eastern Drainage Channel (CAS 58-10-05)
- UC-4 Mud Pit Area Y (no assigned CAS #)

D.4.2.1 Survey Grid and Elevations

A survey grid was established over an area of 280.42 x 231.65 m (920 x 760 ft) (Figure D.4-2). The extent of the grid was selected to include all of the mud pits and key features. Aerial photos, existing drawings (primarily from the CAIP), and on-site observations were used to select the boundaries of the grid. All field observations and measurements are referenced to the grid northing and easting coordinates in feet. Near the site, two ravines one to the north (CASs 58-10-02 and 58-10-05) and one to the south CAS 58-10-04 which contained drilling mud/cuttings were not included within the grid due to their locations and extents; however, they were investigated and sampled during this effort.

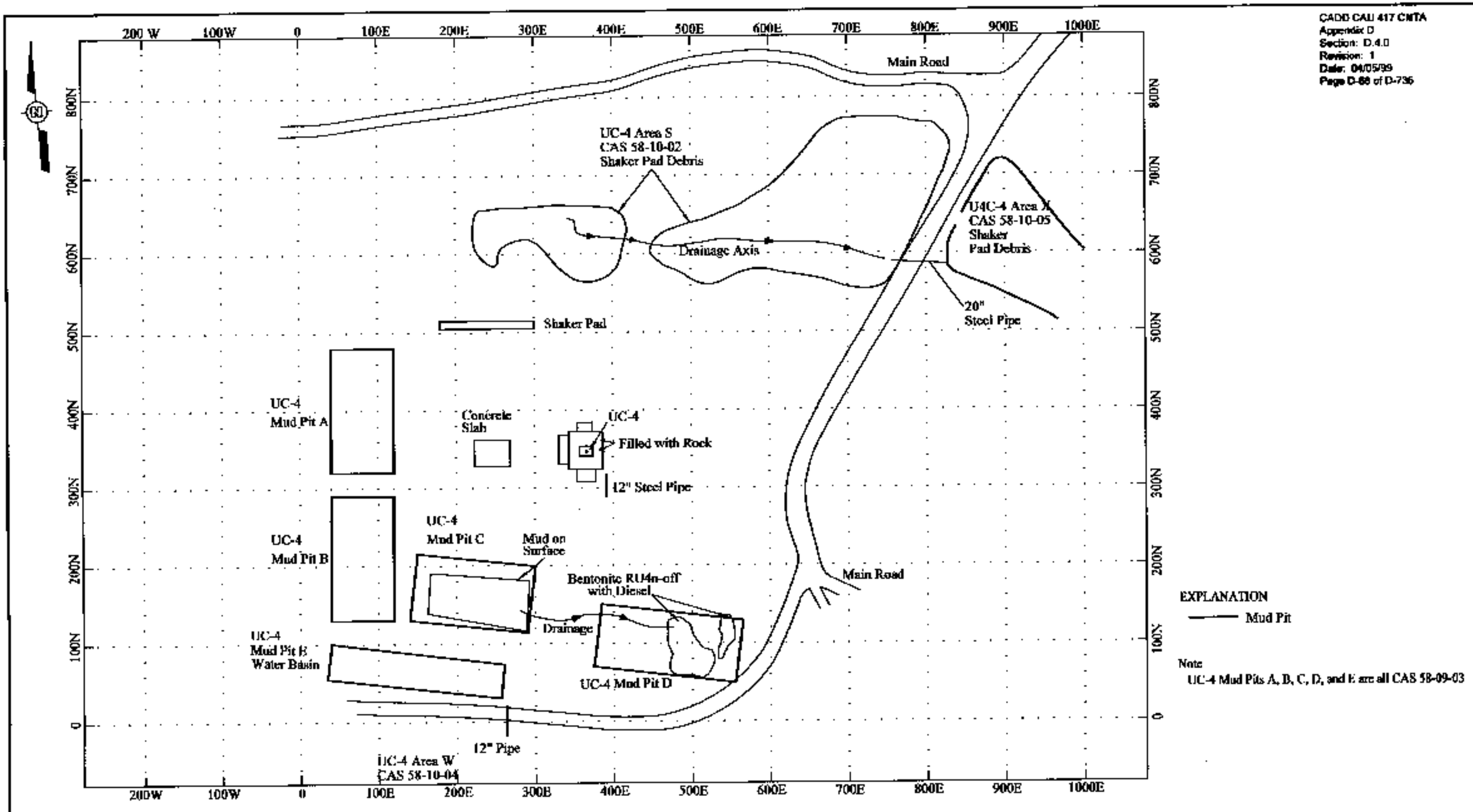
All field observations, measurements and coordinates in the following text are referenced to the grid northing and easting coordinates in feet. Local grid coordinates were translated into UTM coordinates during field operations for compatibility with existing DOE databases. See Attachment A for a table of control points for the UC-4 area.

Digital elevation data were acquired for 433 stations over the entire grid generally at a 12.19-m (40-ft) sample spacing as well as over the grid extension to the west. Attachment H shows the elevation map for UC-4. Elevations at UC-4 range from 1,985.65 to 2,005.13 m (6,514 to 6,578 ft) and average 1,996.10 m (6,548 ft). Attachment B provides data regarding digital elevation measurements.

D.4.2.2 On-site Observations

Figure D.4-2 shows the observed locations of site features relative to the rectangular grid established at the site. The suspected position of the mud pits (CAS 58-09-03) and shaker pad (CAS 58-10-02) shown in Figure D.4-2 and other figures are based upon the CAIP drawings, aerial photos, field observations and surface geophysical data. UC-4 Mud Pit C is visible at the surface and drains through a breach in its berm to the east.

The UC-4 area is bounded on three sides (south, east, and north) by dirt roads. The UC-4 emplacement hole (CAS 58-30-02) is located in roughly the center of the site at 365E, 350N, and is surrounded by a concrete pad. A separate concrete pad, which served as the floor of a metal building, lies about 22.86 m (75 ft) to the west of the hole. Shaker pad debris is visible in a large ravine across the northern portion of the site; it appears to drain to the east, extending under the



Note
UC-4 Mud Pits A, B, C, D, and E are all CAS 58-09-03

SCALE
0 100 200 Feet
0 40 80 Meters

Figure D.4-2
UC-4 Area
Location Map Showing Site Features

road via a 56-cm (20-in.) steel pipe and continues down a valley to the east. Due to the apparent large quantity of mud relative to cuttings, it appears that drilling mud may have discharged into this ravine. Similar waste material is visible in a valley south of the site that drains to the southeast.

D.4.2.3 Surface Geophysics

The following sections provide information regarding the location and nature of geophysical surveys conducted on the UC-1 area sites.

EM31

EM31 conductivity and in-phase (metal) data was acquired over four areas. These four areas include:

- The site grid, along parallel lines oriented north-south with a line spacing of 6.10 m (20 ft) (Figure D.4-3).
- West of the site grid extending from 0E to 190W and from 260N to 540N at a line spacing of 3.05 m (10 ft) oriented both in the north-south and east-west directions.
- The drainage channel east of the grid which contains light-colored material that is runoff from the shaker pad area flowing from a pipe beneath the road. Ten separate EM31 profile lines were run perpendicular to the axis of the ravine. Their locations relative to the grid are shown in Figure D.4-4. Profiles R1-R10 extend across the valley east of the grid.
- The drainage channel south of the grid which also contains a light colored material similar to that from the shaker pad. Ten separate EM31 profile lines were run perpendicular to the axis of the ravines. Their locations relative to the grid are shown in Figure D.4-4. Profiles R101-R110 extend across the valley south of the grid.

EM38

EM38 data were acquired along one line (80E) running north-south through UC-4 Mud Pits A and B. This data provided an indication of the lateral continuity of the mud pits within the shallow soils.

Magnetometer and Metal Detector Pipe Locator

A magnetometer and metal detector pipe locator was used for survey work completed west of the grid. These instruments were used to identify potential underground storage tanks or trace suspected pipelines in the area previously used for operational trailers.

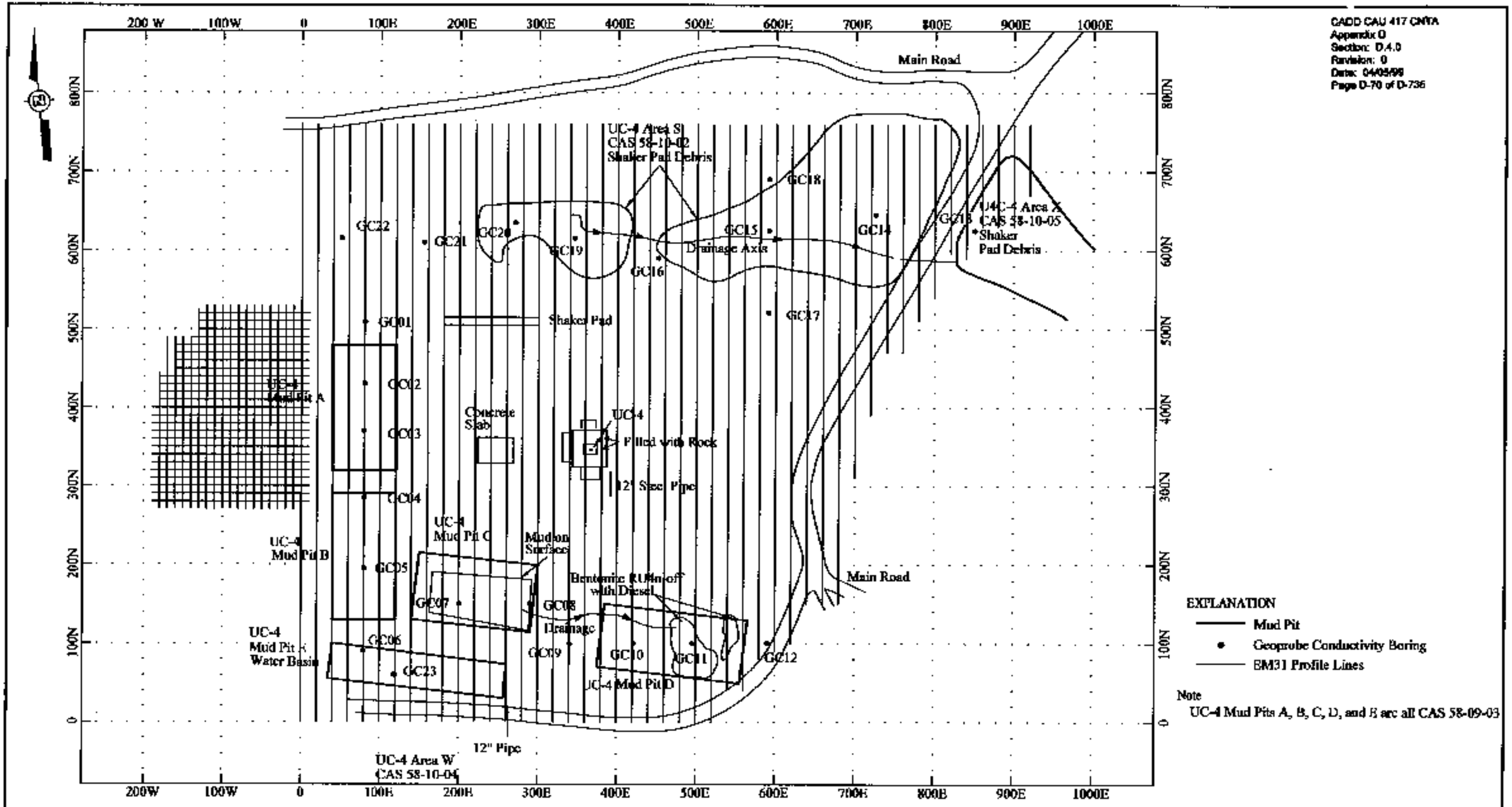


Figure D.4-3
UC-4 Area Location Map
Showing Geoprobe™ Conductivity Borings
and EM31 Profile Lines

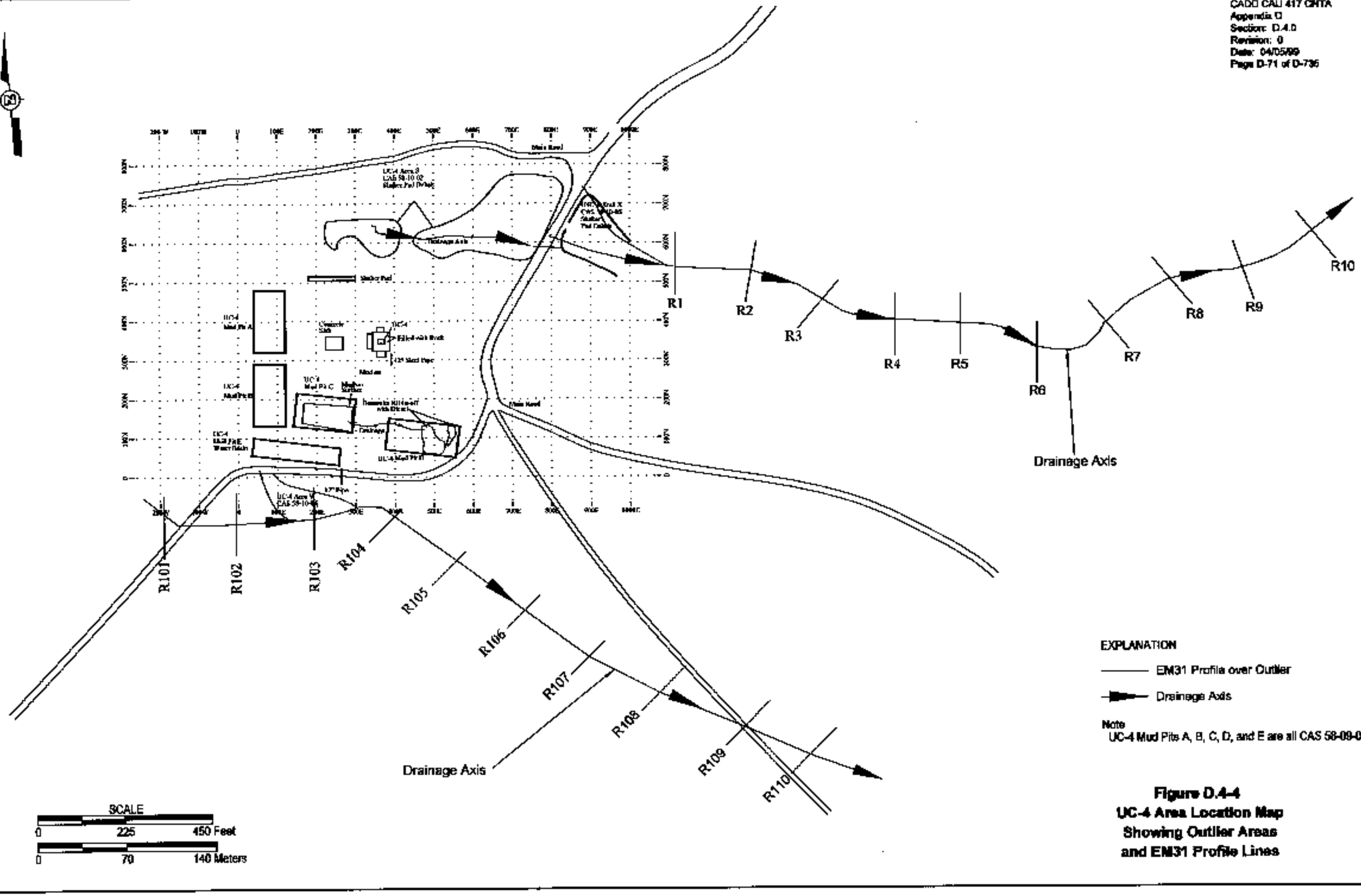


Figure D.4-4
UC-4 Area Location Map
Showing Outlier Areas
and EM31 Profile Lines

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D.4.2.4 Geoprobe™ Conductivity Logs

Geoprobe™ conductivity logs were acquired at 23 locations within the grid (Figure D.4-3). They are labeled sequentially UC4-GC01 through UC4-GC23. One location, UC4-GC08, was not completed since ground conditions were too hard. Plots of the conductivity logs are included in Attachment E.

D.4.2.5 Chemical Sampling and Analysis

There were 62 soil borings completed within the UC-4 area of investigation. Attachment I includes the coordinates of the soil borings. Borings ranged in depth from 0.61 to 3.66 m (2 ft to 12 ft). The initial six borings within the UC-4 area mud pits were located as specified in the CAIP. Each mud pit was divided into six roughly equal area sections by bisecting the mud pit along its long axis and trisecting the mud pit in the short dimension. A boring was located near the center of each of the sections. Borings within non-mud pit sites such as shaker debris areas were located within areas of visible drilling related materials.

Three waste characterization samples were obtained from two sites. A waste characterization sample was collected from borings advanced in UC-4, Mud Pits A, C, and D for purposes of IDW disposal and mud pit characterization. The location of these borings and the sample intervals were determined from previously completed ESC investigation-related borings.

All borings were advanced to their total depth, where possible, using conventional truck-mounted direct-push boring equipment. In several cases borings had to be advanced using hand techniques due to unstable surface conditions in mud pits and shaker areas.

Soil samples collected from individual borings were submitted to on- and off-site laboratory facilities for analysis. There were 257 samples collected for investigation of CASs and suspect areas within the UC-4 well area. These samples were submitted to on-site laboratory facilities for the analysis of chromium (total and hexavalent) and TPH diesel/motor oil. Waste characterization and mud pit characterization samples were collected and submitted to off-site laboratories as described in Section 1.2.3 Phase 2 Work Scope.

D.4.3 Summary of Results

The following sections present the results of geophysical and chemical investigations of the UC-4 area.

D.4.3.1 Geophysical Measurements

The contoured EM31 data show high conductivity areas relating to mud pit locations, buried metal, and surface features such as the reinforced concrete pads (Figure D.4-5). The contoured EM31 in-phase (metal) data show anomalies related to reinforced concrete pads, buried metal, and surface metal (Figure D.4-6). Those conductivity anomalies in Figure D.4-5 that do not have a corresponding in-phase anomaly in Figure D.4-6 can be assumed to be related to natural geologic conditions, mud pits, shaker pad debris or other electrically conductive materials.

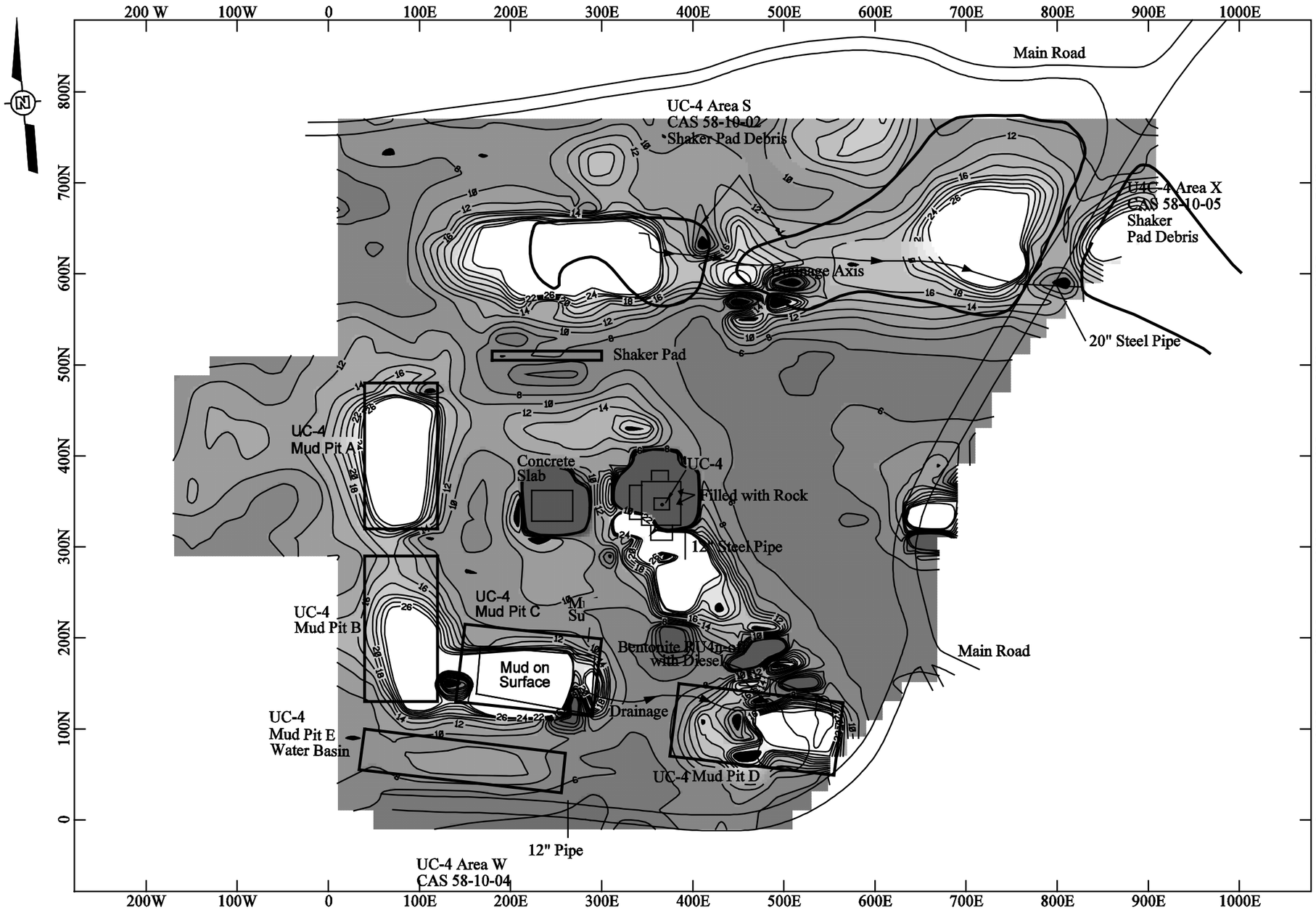
Background EM31 terrain conductivity values are approximately 8 to 10 mS/m at the UC-4 site. EM31 conductivity values increase dramatically to well above 30 mS/m over the mud pits. The areas of higher conductivities correspond well to the pit locations estimated from historical aerial photography. This allowed chemical sample locations to be selected with confidence.

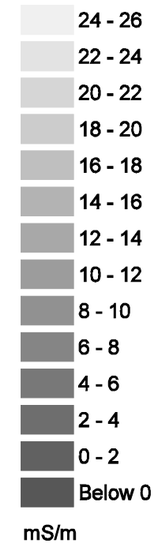
Additional anomalies at UC-4 are dominantly associated with buried metals. An area of elevated conductivity and in-phase (metal) anomalies trends southeast between the UC-4 well and UC-4 Mud Pit D. This trend may represent a mud flow area between the well and Mud Pit 4D as well as significant buried metal. An isolated in-phase (metal) anomaly is identified just east of the main south-north dirt road. This anomaly is roughly centered at 660E and 320N.

Geoprobe™ conductivity data was found to be an excellent indicator of the depth and thickness of mud layers due to the very high conductivity of the moist mud in comparison to background conductivity. For this reason, sampling depths in each particular pit and shaker area could be targeted at known mud depths.

D.4.3.2 Chemical Sampling and Analysis

The UC-4 well area contained five sites of investigation. Based on soil sample analytical results from borings at these sites, two of these sites were determined statistically to contain materials with TPH diesel/motor oil in excess of the PAL. None of the samples collected from any of the sites investigated contained hexavalent chromium concentrations in excess of the PAL. No radionuclides exceeding background activities were noted during field screening or in samples submitted for off-site analysis for radiologic constituents.





EXPLANATION

Mud Pit

Conductivity Contours

NOTE

UC-4 Mud Pits A, B, C, D, and E are all CAS 58-09-03

SCALE

0 100 200 Feet

0 40 80 Meters

Contour Interval = 2 mS/m

Figure D.4-5
UC-4 Area
EM31 Surface Conductivity Map

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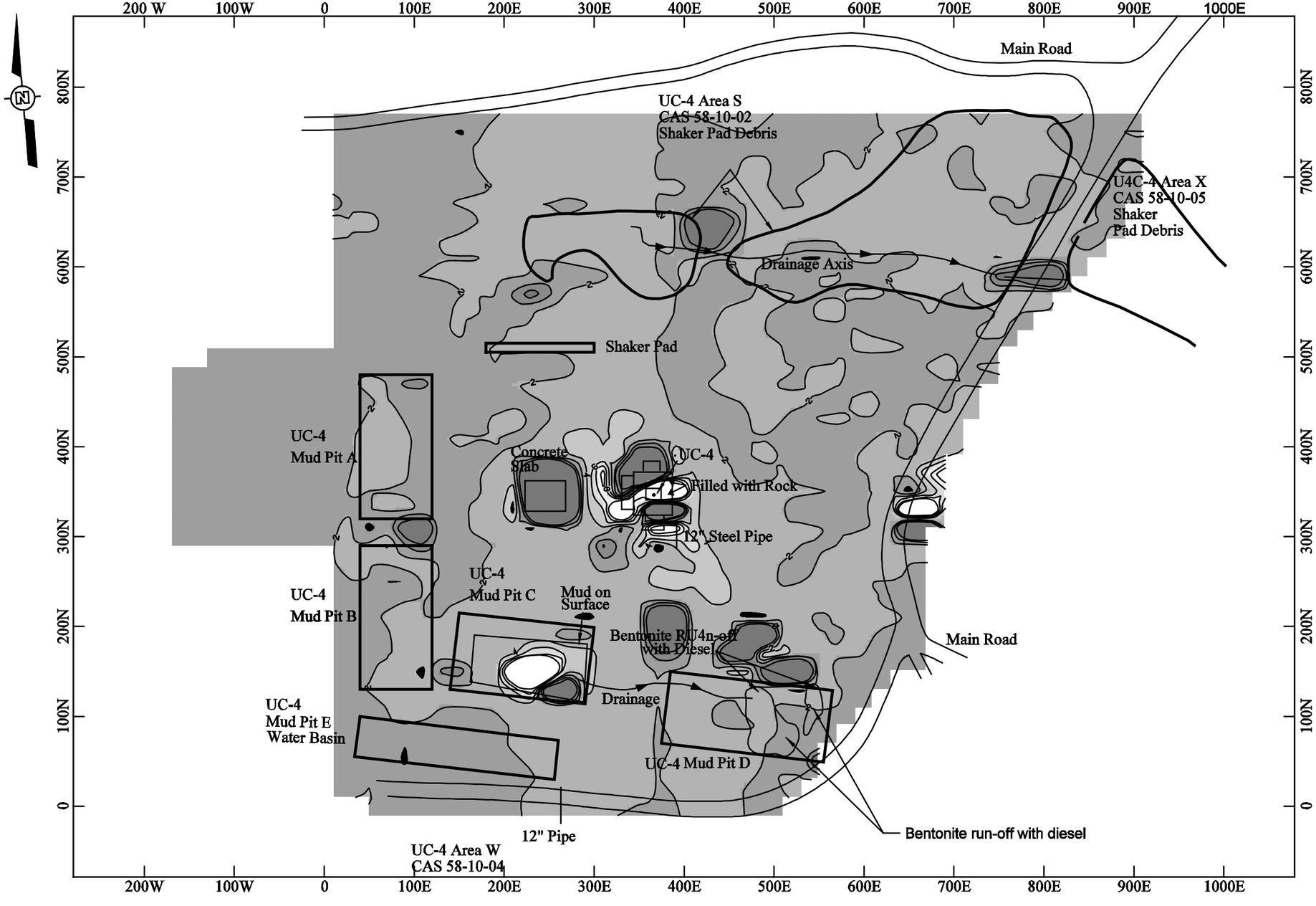
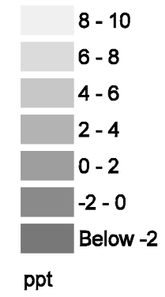
12 MAY 1999





EXPLANATION

Mud Pit

In-phase Contours

NOTE

UC-4 Mud Pits A, B, C, D, and E are all CAS 58-09-03

SCALE

0 100 200 Feet

0 40 80 Meters

Contour Interval = 2 ppt

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12 MAY 1999

Figure D.4-6
UC-4 Area
EM31 In-Phase Metal Survey Map

The following sections describe the extent of the contamination within sites determined statistically to contain COCs. The final section addresses investigated sites that did not have COCs above the PALs.

D.4.3.3 UC-4 Mud Pit A (CAS 58-09-03)

UC-4 Mud Pit A has EM conductivities above background (Figure D.4-5). Based upon the EM31 in-phase (metal) data, no buried metal is located within this mud pit. However, three small in-phase anomalies are located just outside the southern boundary of the mud pit and one small in-phase anomaly is located just outside the northeastern boundary of the pit.

Two Geoprobe™ conductivity logs (UC4-GC2 and UC4-GC3) were located directly in UC-4 Mud Pit A. Two additional conductivity logs (UC4-GC1 and UC4-GC4) are located just outside UC-4 Mud Pit A to the north and south, respectively. Figure D.4-7 shows a cross section of these four conductivity logs along with the surface EM data acquired along Line 80E. Background conductivity values or close to background values are seen in logs UC4-GC1 and UC4-GC4 which are outside the pit boundaries. Conductivity logs UC4-GC2 and UC4-GC3 indicated very high conductivities (>200 mS/m) from 1.83 to 3.05 m (6 to 10 ft) and from 2.13 to 3.35 m (7 to 11 ft), respectively. Based upon this electrical conductivity data, the muds from Pit 4A have well-defined lateral and vertical boundaries.

The UC-4 Mud Pit A was statistically determined to be contaminated with TPH diesel/motor oil concentrations in excess of the PAL of 100 mg/kg. Table D.4-1 provides a summary of the statistical analysis. TPH contamination was indicated in the 0.61-m (2-ft) depth interval/layers between 1.22 - 1.83 m (4 - 6 ft), 1.83 - 2.44 m (6 - 8 ft), and 2.44 - 3.05 m (8 - 10 ft). A combined thickness totaling 1.83 m (6 ft) of contaminated material exists within the UC-4 Mud Pit A.

Eight borings were advanced to total depths of 3.66 m (12 ft). Six borings were advanced within the mud pit, and two borings were advanced outside the perimeter of the mud pit. No TPH diesel/motor oil concentrations above the PAL were encountered in borings U4A7 or U4A8 located outside the mud pit. All borings advanced within the mud pit contained intervals in excess of the PAL for TPH diesel/motor oil. The highest combined TPH diesel/motor oil concentration measured from the respective 0.61-m (2-ft) sample intervals was 336 mg/kg within the interval 1.83 - 2.44 m (6 - 8 ft) in soil boring U4A2. TPH concentrations were below the PAL in the 0 - 1.22 m (0 - 4 ft) interval with the exception of the 0.61 - 1.22 m (2 - 4 ft) interval in boring U4A2, where a combined TPH diesel/motor oil concentration of 116.6 mg/kg was reported.

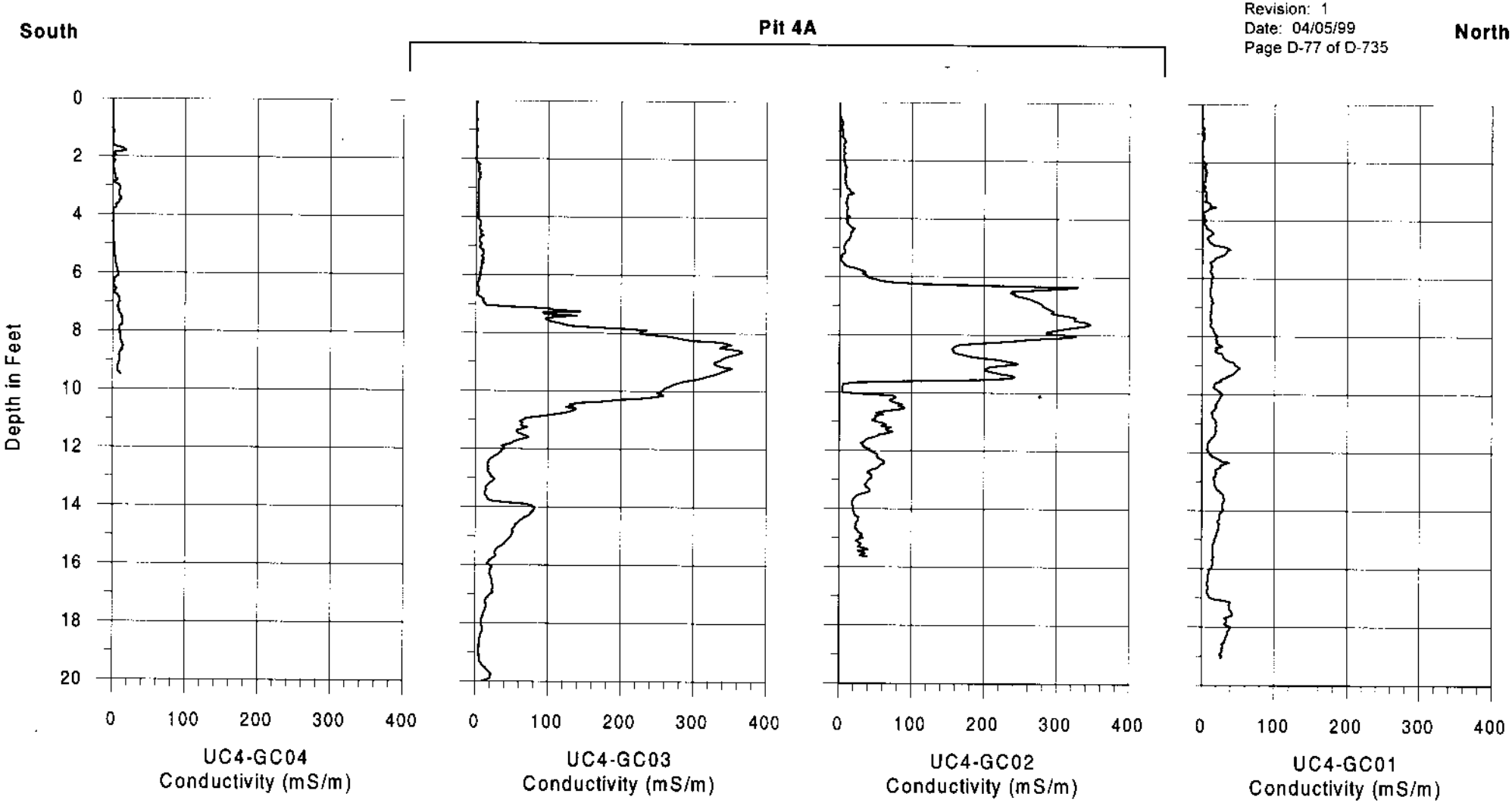


Figure D.4-7
UC-4 Mud Pit A North-South Cross Section
Showing Geoprobe™ Conductivity Profiles

Table D.4-1
Statistical Analysis for Mud Pit Sampling
Central Nevada Test Area - UC-4 Area
(Page 1 of 3)

Area of Investigation	Sampling Interval/Layer	Analyte	Boring Number												Statistically Derived Required No. of Samples	Concentration Above (+) or Below (-) Action Levels	Layer Determination
			u4a1	u4a2	u4a3	u4a4	u4a5	u4a6	u4a7	u4a8					(Nd)	(<>+U-AL)	
UC-4 Mud Pit A	0-2’	TPH	34.7	24.9	24.9	39.2	54.9	14.5	H	H					1	-59	non-cont.
"	2-4’	TPH	65.5	116.6	31.2	87.6	24.7	25.5	16.7	14.5					6	-19	non-cont.
"	4-6’	TPH	15.2	132.3	68.9	235.8	88.8	107.4	14.2	14.3					555	53	contaminated
"	6-8’	TPH	164.4	336	289.5	272	285.2	264	13.7	14.2					1	203	contaminated
"	8-10’	TPH	131.6	176.5	123.3	117.8	319.9	204.2	35.6	18					7	125	contaminated
"	10-12’	TPH	48.6	63.2	59.6	58.8	59.1	94.5	R	R					2	-27	non-cont.
"	0-2’	Cr+6	50	50	50	62.4	50	50	NT	NT					1	-345	non-cont.
"	2-4’	Cr+6	50	50	50	50	50	50	50	64					0	-350	non-cont.
"	4-6’	Cr+6	50	95.4	50	14.9	196	14.3	50	50					1	-289	non-cont.
"	6-8’	Cr+6	215	274	15.5	296	217	15.5	50	50					2	-152	non-cont.
"	8-10’	Cr+6	200	15.1	15.1	192	16.3	116	50	50					1	-254	non-cont.
"	10-12’	Cr+6	60.8	64.4	50	50	50	50	NT	NT					1	-342	non-cont.
			u4b1	u4b2	u4b3	u4b4	u4b5	u4b6	u4b7								
UC-4 Mud Pit B	0-2’	TPH	17.3	L	L	L	L	L	H						NA	NA	non-cont.
"	2-4’	TPH	11.5	40.3	79.3	41.2	68.2	52.5	76.1						2	-37	non-cont.
"	4-6’	TPH	84.2	64.3	88.6	55.9	83.7	99.5	96.3						5	-11	non-cont.
"	6-8’	TPH	162.4	71.8	198.3	117.5	235.2	248.1	89.7						6	114	contaminated
"	8-10’	TPH	100.2	78.2	69.5	93.7	59.5	52.1	13.7						4	-13	non-cont.
"	10-12’	TPH	11	NT	60.2	62	61.6	NT	NT						2	-31	non-cont.
"	0-2’	Cr+6	50	L	L	L	L	L							NA	NA	non-cont.
"	2-4’	Cr+6	50	50	H	50	50	50	50						0	-350	non-cont.
"	4-6’	Cr+6	50	50	50	50	50	264	50						1	-262	non-cont.
"	6-8’	Cr+6	13.7	237	14.5	13.4	14.4	14.5	50						1	-294	non-cont.
"	8-10’	Cr+6	207	15.3	121	217	50	75.7	50						1	-236	non-cont.
"	10-12’	Cr+6	50	NT	50	50	50	NT	NT						0	-350	non-cont.
			u4c1	u4c2	u4c3	u4c4	u4c5	u4c6	u4c7								
UC-4 Mud Pit C	0-2’	TPH	120.5	185.1	493	160.2	985	900	NT						8	607	contaminated
"	2-4’	TPH	148.5	275.7	NT	121.5	381	178.2	231.9						4	180	contaminated
"	4-6’	TPH	R	R	R	R	R	R	150.2						NA	NA	non-cont.
"	0-2’	Cr+6	13	15*	18.7	13.1	20.2	32.7	ND						1	-377	non-cont.
"	2-4’	Cr+6	15.4	21.5	NT	13.6	16.9	20.4	15.5						1	-381	non-cont.
"	4-6’	Cr+6	R	R	R	R	R	R	50						NA	NA	NA
			u4c8	u4c9	u4c10	u4c11											
UC-4 Breach Area	0-2’	TPH	73.2	63.4	21.6	35.8									NA	NA	NA
"	2-4’	TPH	NT	NT	28.7	44.3									NA	NA	NA
"	4-6’	TPH	NT	NT	58.5	27.1									NA	NA	NA
"	6-8’	TPH	NT	NT	17.7	13.8									NA	NA	NA
"	0-2’	Cr+6	195	12.2	50	50									NA	NA	NA
"	2-4’	Cr+6	NT	NT	50	50									NA	NA	NA
"	4-6’	Cr+6	NT	NT	50	50									NA	NA	NA
"	6-8’	Cr+6	NT	NT	50	50									NA	NA	NA

Table D.4-1
Statistical Analysis for Mud Pit Sampling
Central Nevada Test Area - UC-4 Area
(Page 2 of 3)

			u4d1	u4d2	u4d3	u4d4	u4d5	u4d6	u4d7	u4d8							
UC-4 Mud Pit D	0-2’	TPH	43.6	26.8	64.4	22.6	73.4	37.9	H	H					1	-43	non-cont.
"	2-4’	TPH	66.4	74.4	30	27.8	21	54.1	H	28					2	-41	non-cont.
"	4-6’	TPH	75.4	184.1	302	60.1	55.3	33.8	53.4	66.8					210	81	contaminated
"	6-8’	TPH	1700	167	46.2	178.9	25.1	1504	12.8	38.7					16	973	contaminated
"	8-10’	TPH	157.2	77	35.7	961	81.3	47.9	13.2	38.3					54	345	contaminated
"	10-12’	TPH	57.7	15.9	NT	49.8	78.9	51.1	H	low rec					2	-34	non-cont.
"	12-14’	TPH	NT	NT	NT	61	NT	NT							NA	NA	NA
"	0-2’	Cr+6	84.4	69.7	306	50	107	96.8	NT	NT					1	-224	non-cont.
"	2-4’	Cr+6	50	50	103	50	50	50	NT	50					1	-325	non-cont.
"	4-6’	Cr+6	50	189	16.3	50	50	50.2	50	64					1	-296	non-cont.
"	6-8’	Cr+6	255	14.7	13.3	13.5	64.9	17.4	50	50					1	-279	non-cont.
"	8-10’	Cr+6	50	50	52.2	15.6	66.8	214	50	50					1	-283	non-cont.
"	10-12’	Cr+6	50	50	NT	70.2	50	50	NT	NT					1	-340	non-cont.
"	12-14’	Cr+6	NT	NT	NT	50	NT	NT	NT	NT					NA	NA	NA
			u4e1	u4e2													
UC-4 Mud Pit E	0-2’	TPH	70.1	82.2											1	-5	non-cont.
"	2-4’	TPH	55.2	60.4											1	-34	non-cont.
"	4-6’	TPH	58.6	R											NA	NA	NA
"	0-2’	Cr+6	50	13.4											1	-312	non-cont.
"	2-4’	Cr+6	50	50											1	-350	non-cont.
"	4-6’	Cr+6	50	R											NA	NA	NA
			u4s1	u4s2	u4s3	u4s4	u4s5	u4s6	u4s7	u4s8	u4s9	u4s10	u4s11	u4s12			
UC-4 Shaker Pad Area	0-2’	TPH	49.4	43.3	273	29.4	49.9	182.6	NT	NT	15.9	14.5	57.9	51	see below	see below	see below
"	2-4’	TPH	22.6	268	61.7	100.8	38.3	862	40.5	14.3	17.4	15.3	47.9	32.6	see below	see below	see below
"	4-6’	TPH	41.7	117.9	26.4	45.2	20.1	493	192	17.2	13.7	15.7	53	42.8	see below	see below	see below
"	6-8’	TPH	23.7	17.5	56.5	14.6	14.3	257.5	18.9	13.9	36.7	13.5	14	24.1	see below	see below	see below
"	8-10’	TPH	22.6	23.8	123.6	NT	13.6	16.2	13.6	NT	26.7	29.6	16.4	29.3	see below	see below	see below
"	10-12’	TPH	13.8	NT	NT	NT	21.9	NT	NT	NT	R	14.2	NT	NT	see below	see below	see below
"	0-2’	Cr+6	98	271	14.9	158	289	13.5	NT	NT	50	50	210	96.1	see below	see below	see below
"	2-4’	Cr+6	157	17.9	17.9	15	50	20.3	153	50	50	50	13.5	50	see below	see below	see below
"	4-6’	Cr+6	14	264	295	65	50	20.1	14.4	50	50	50	275	50	see below	see below	see below
"	6-8’	Cr+6	149	242	206	50	50	17.1	199	50	50	50	69.1	50	see below	see below	see below
"	8-10’	Cr+6	120	50	50	50	50	50	50	50	50	50	51	76.6	see below	see below	see below
"	10-12’	Cr+6	50	NT	NT	NT	50	NT	NT	NT	R	50			see below	see below	see below
			u4s13	u4s14													
UC-4 Shaker Pad Area	0-2’	TPH	21.3	29.8											3101	65	non-cont.
"	2-4’	TPH	13.6	52.7											96	221	contaminated
"	4-6’	TPH	13.3	48.7											473	101	contaminated
"	6-8’	TPH	13.7	50.2											21	-6	non-cont.
"	8-10’	TPH	13.2	47.9											3	-38	non-cont.
"	10-12’	TPH	NT	H											1	-70	non-cont.
"	0-2’	Cr+6	122	50											NA	NA	NA
"	2-4’	Cr+6	50	72.2											NA	NA	NA
"	4-6’	Cr+6	50	64											NA	NA	NA
"	6-8’	Cr+6	50	50											NA	NA	NA
"	8-10’	Cr+6	50	50											NA	NA	NA
"	10-12’	Cr+6													NA	NA	NA

Table D.4-1
Statistical Analysis for Mud Pit Sampling
Central Nevada Test Area - UC-4 Area
(Page 3 of 3)

			u4w1	u4w2	u4w3	u4w4	u4w5	u4w6									
UC-4 Area W	0-2’	TPH	128.6	51.3	18	76.7	H	H							NA	NA	NA
"	2-4’	TPH	207.6	54	13.6	24	H	H							NA	NA	NA
"	4-6’	TPH	301.3	36.3	H	H	H	H							NA	NA	NA
"	6-8’	TPH	145.9	R											NA	NA	NA
"	8-10’	TPH	27.5	R											NA	NA	NA
"	10-12’	TPH	13.7	R											NA	NA	NA
"	0-2’	Cr+6	14	12.4	100	402	H	H							NA	NA	NA
"	2-4’	Cr+6	16.8	50	50	118	H	H							NA	NA	NA
"	4-6’	Cr+6	15.6	50	H	H	H	H							NA	NA	NA
"	6-8’	Cr+6	17.6												NA	NA	NA
"	8-10’	Cr+6	147												NA	NA	NA
"	10-12’	Cr+6	50												NA	NA	NA
			u4x1	u4x2	u4x3	u4x4	u4x5										
UC-4 Area X	0-2’	TPH	73.8	59.1	39.9	48.2	H								NA	NA	NA
"	2-4’	TPH	65.6	33.2	22.2	29.3	H								NA	NA	NA
"	4-6’	TPH	131.2	R	H	H	H								NA	NA	NA
"	6-8’	TPH	82.5	R											NA	NA	NA
"	8-10’	TPH	22	R											NA	NA	NA
"	10-12’	TPH	R	R											NA	NA	NA
"	0-2’	Cr+6	14.5	12.7	257	191	H								NA	NA	NA
"	2-4’	Cr+6	15	52.1	50	50	H								NA	NA	NA
"	4-6’	Cr+6	15.4	R	H	H	H								NA	NA	NA
"	6-8’	Cr+6	63.6												NA	NA	NA
"	8-10’	Cr+6	80.5												NA	NA	NA
"	10-12’	Cr+6													NA	NA	NA

NOTES:

All values are reported as milligrams/kilogram (mg/kg)
Nd = number of samples needed to make decision
<> = mean value of all measurements in given layer
U = upper confidence limit
AL = action level (100mg/kg TPH & 400 mg/kg Hex Cr)
If <>+U-AL > 0 then layer is above Action Level But if <0 then layer is below Action level
TPH = sum of diesel and motor oil components
NT = Sample not taken
R = No sample collected due to refusal conditions within boring
H = Sample collected and held by laboratory and not analyzed
NA = Not analyzed
NS = No sample taken boring not advanced to depth
u4x = Boring and associated samples included in statistical calculation

Analytical results for samples including QA/QC samples collected within UC-4 Mud Pit A are presented in Attachment F. Figure D.4-8 provides the location of borings with samples exceeding the PAL for TPH diesel/motor oil. Figure D.4-9 displays TPH data with respect to depth at all of the UC-4 Mud Pit A sampling locations.

Soil descriptions prepared by site geologists indicate the contaminated intervals occur principally within a horizon of drill cuttings mixed with moist drilling muds. The materials overlying the contaminated horizon within the 0 - 1.22 m (0 - 4 ft) interval are native soils comprised of dry silty sands mixed with some gravel. The uncontaminated materials that occur below the layers of TPH contamination in the 3.05 - 3.66 m (10 - 12 ft) interval are comprised of mixed sands and gravels grading to volcanic bedrock. Soil boring logs and cross-sectional views of the borings completed in UC-4 Mud Pit A are provided in Attachment J.

The volume of TPH-contaminated material in the UC-4 Mud Pit A occurs over an area measuring approximately 49 m (160 ft) in length and 24 m (80 ft) in width, with a thickness of 1.83 m (6 ft). Based on these dimensions the volume of contaminated material within UC-4 Mud Pit A is calculated at approximately 2,176 m^3 (2,844 yd^3).

D.4.3.4 UC-4 Mud Pit B (CAS 58-09-03)

UC-4 Mud Pit 4B had EM conductivities above background (Figure D.4-5). Some buried metals are indicated in the southeast corner of the pit, where it seems to merge with UC-4 Mud Pit 4C.

One Geoprobe™ conductivity log (UC4-GC5) was located directly in UC-4 Mud Pit B and two additional conductivity logs (UC4-GC4 and UC4-GC6) were located just outside Mud Pit 4B, to the north and south, respectively. Figure D.4-10 shows a cross section of these three conductivity logs. Conductivity values at or very close to background values are seen in logs UC4-GC4 and UC4-GC6 outside the pit boundaries. Conductivity log UC4-GC5 had very high conductivities (>200 mS/m) from 1.83 to 2.74 m (6 to 9 ft). Based upon this electrical conductivity data, the muds from Pit 4B have well-defined lateral and vertical boundaries.

The UC-4 Mud Pit B was statistically determined to be contaminated with TPH diesel/motor oil in excess of the PAL. A summary of the statistical evaluation is provided in Table D.4-1. TPH contamination above the PAL was indicated in 0.61-m (2-ft) depth intervals/layers between 1.83 - 2.44 m (6 - 8 ft). The total thickness of contaminated material identified with the mud pit is 0.61 m (2 ft).

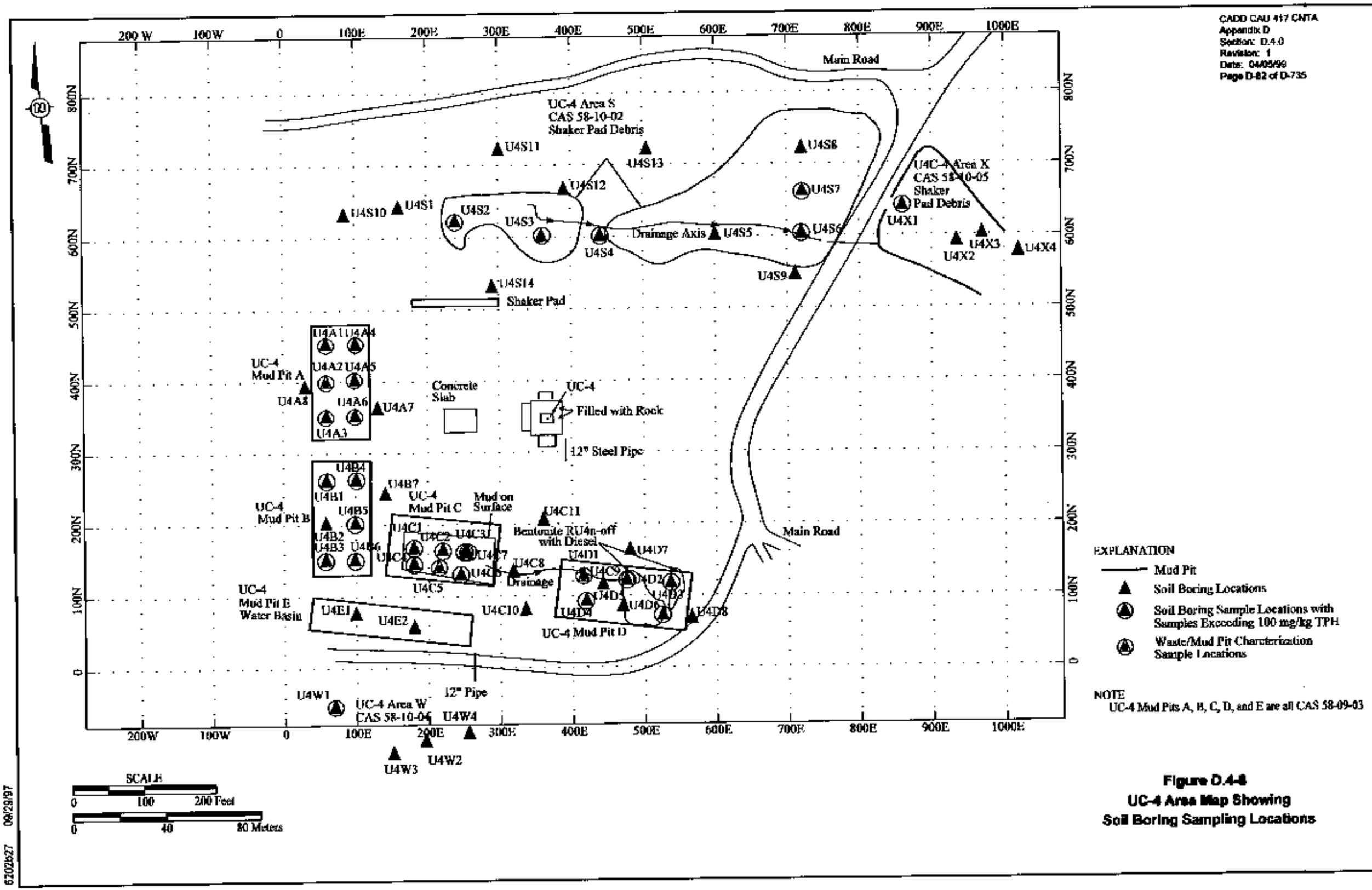


Figure D.4-8
UC-4 Area Map Showing
Soil Boring Sampling Locations

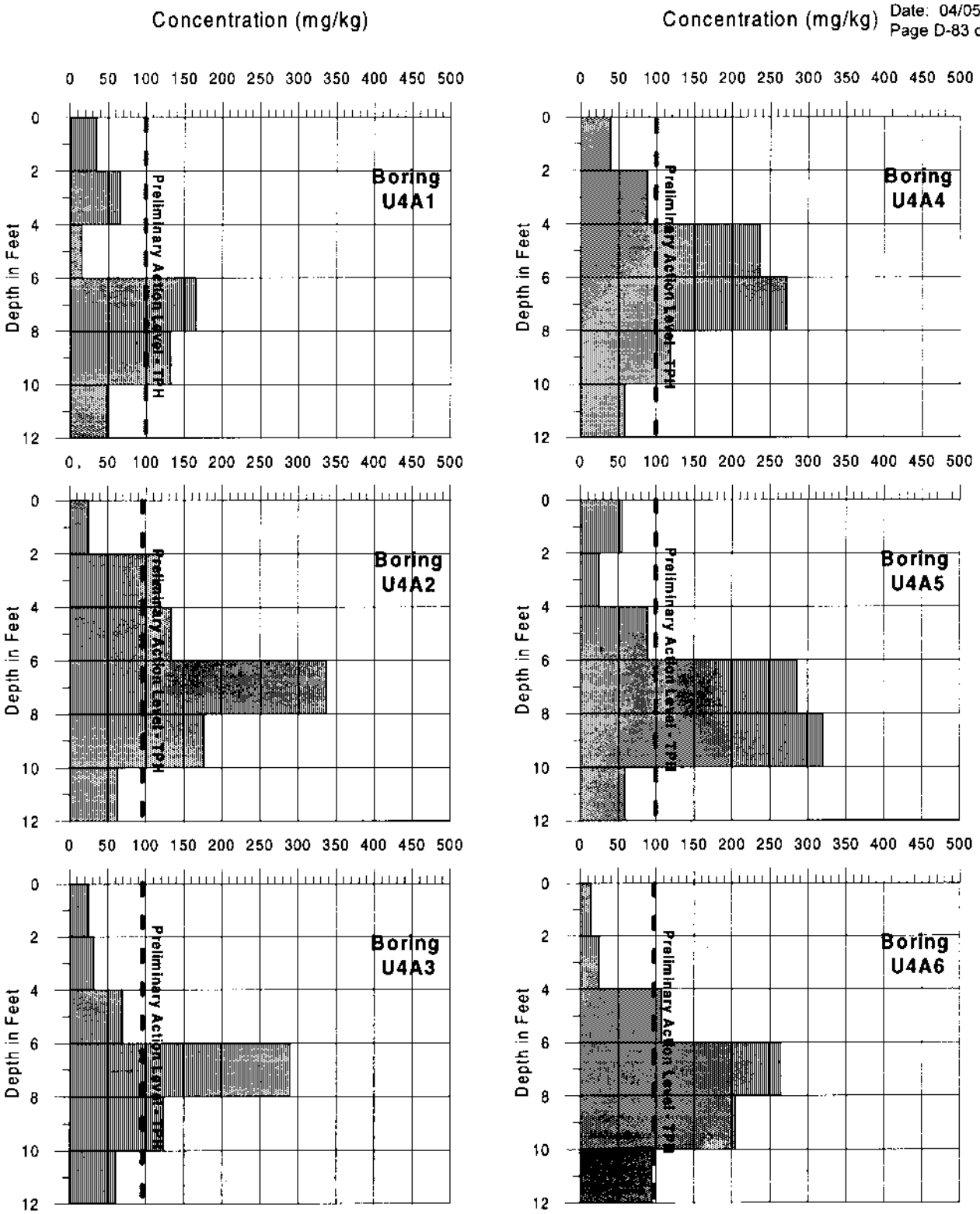


Figure D.4-9
UC-4 Mud Pit A
TPH Concentrations from Chemical Sampling

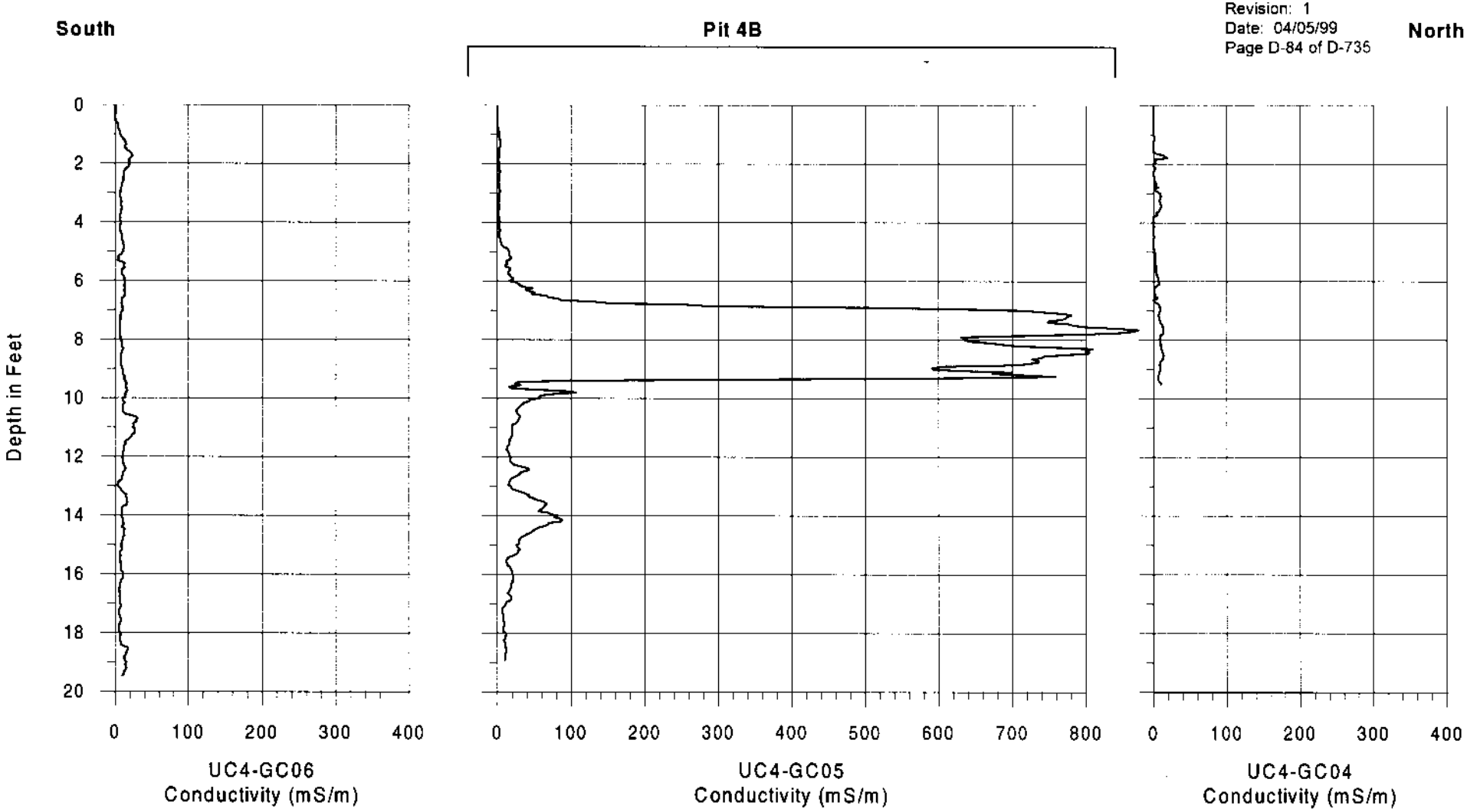


Figure D.4-10
UC-4 Mud Pit B North-South Cross Section
Showing Geoprobe™ Conductivity Profiles

Seven borings were advanced to depths of 3.66 m (12 ft) below the ground surface. Six borings were advanced within the mud pit and a single boring, U4B7, was advanced outside the mud pit. No TPH diesel/motor oil concentrations above the PAL were reported in the U4B7 boring. With the exception of boring U4B2, all borings advanced within the perimeter of the mud pit encountered intervals with TPH diesel/motor oil concentrations in excess of PAL. The highest combined TPH concentration reported at 248 mg/kg occurred within the interval 1.83 - 2.44 m (6 - 8 ft) in boring U4B6. TPH concentrations within the mud pit were below the PAL at every location within the 0 - 1.83 m (0 - 6 ft) interval and in the 2.44 - 3.66 m (8 - 12 ft) interval with the exception of the 2.44 - 3.05 m (8 - 10 ft) interval in boring U4B1, which was slightly above the action levels with a reported TPH concentration of 100.2 mg/kg.

A summary of the statistical evaluation is provided in Table D.4-1. Analytical results for soil samples including associated QA/QC samples collected at UC-4 Mud Pit B are provided in Attachment F. Figure D.4-8 provides the location of borings with TPH diesel/motor oil in excess of the site action level. Figure D.4-11 displays TPH data with respect to depth at all of the Pit 4B sampling locations.

Soil descriptions prepared by site geologists indicate the TPH-contaminated interval between 1.83 - 2.44 m (6 - 8 ft) occurs within a horizon of drill cuttings mixed with moist to damp drilling muds. The uncontaminated materials between 0 - 1.83 m (0 - 6 ft) are comprised of native soils used as backfill consisting of dry sands and gravels. The uncontaminated materials that occur in the 2.44 - 3.05-m (8 - 10-ft) interval are composed of mixed sands and gravels grading to volcanic bedrock at the base. The uncontaminated materials that occur in the 3.05 - 3.66 m (10 - 12 ft) interval are composed of light yellow/brown ash flow tuff bedrock and slightly oxidized brown/yellow chert grains.

Soil boring logs and cross-sectional views of the completed borings for UC-4 Mud Pit B are provided in Attachment J.

The volume of TPH-contaminated materials contained in UC-4 Mud Pit B occur over an area measuring approximately 48.77 m (160 ft) in length and 24.38 m (80 ft) in width, with a thickness of 0.61 m (2 ft). Based on these dimensions the volume of the TPH-contaminated material within UC-4 Mud Pit B is calculated to be approximately 725 m^3 (948 yd^3).

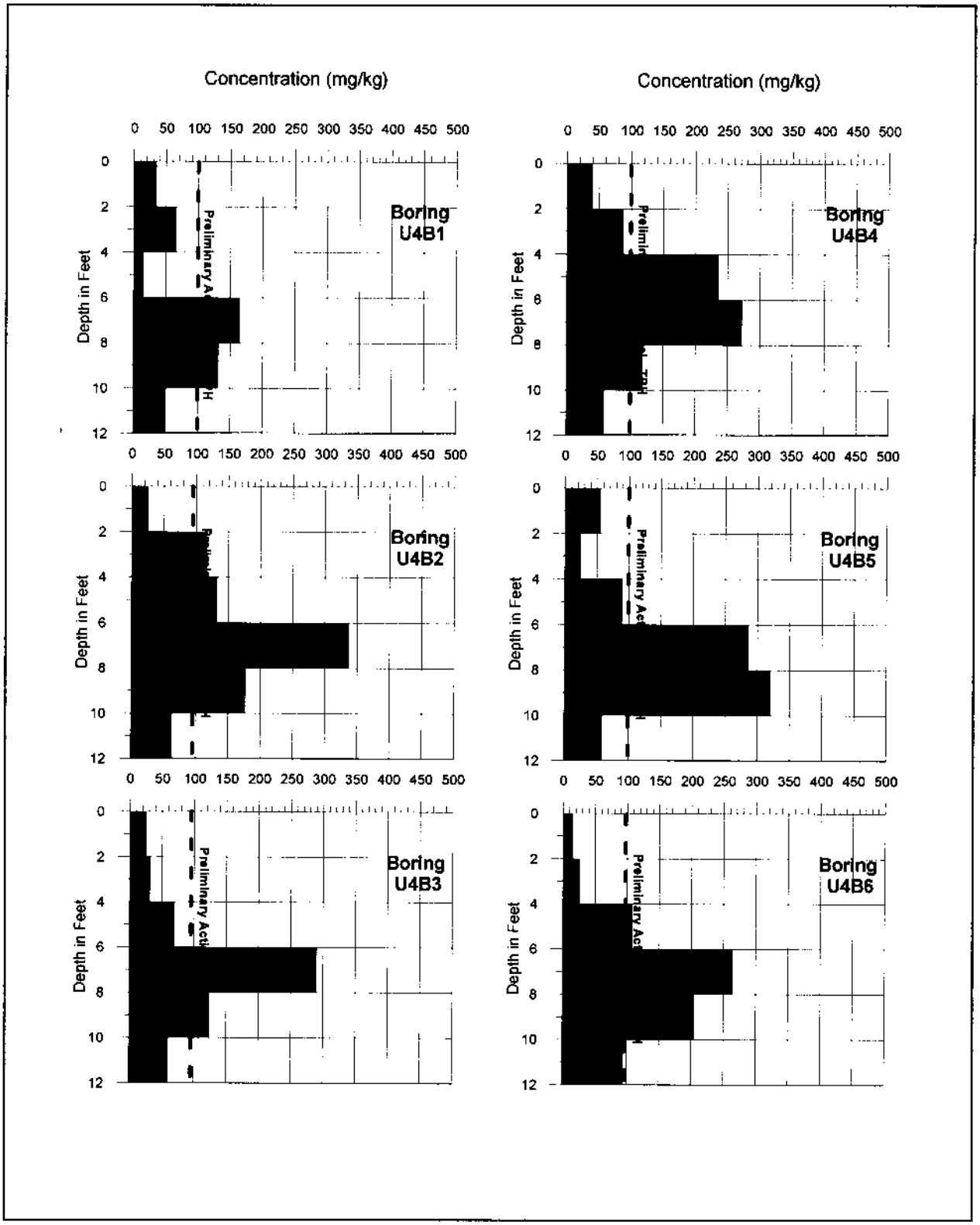


Figure D.4-11
UC-4 Mud Pit B
TPH Concentrations from Chemical Sampling

D.4.3.5 UC-4 Mud Pit C (CAS 58-09-03)

Drilling mud in UC-4 Mud Pit C is visible at the surface (Figure D.4-2). EM conductivities above background surround the observed mud pit and extend over an area of 1,570 m^2 (16,900 ft^2) (Figure D.4-5). The in-phase (metal) data suggest that buried metal is located within the eastern half of the mud pit (Figure D.4-6).

A single Geoprobe™ conductivity log (UC4-GC7) was completed within this pit. A second conductivity log (UC4-GC8) was attempted but, it hit shallow refusal and was abandoned. Previous attempts at manual sampling in this area have met with refusal at a depth of approximately 1.22 m (4 ft). Heavier truck-mounted equipment has not been used due to the soft nature of the dried mud surface.

In addition to log UC4-GC7 inside UC-4 Mud Pit C, one Geoprobe™ conductivity log UC4-GC9 is located about 20 m (60 ft) to the southeast of the pit. Figure D.4-12 shows these two conductivity logs. Conductivity very close to background values are seen in logs UC4-GC9 outside the pit boundaries. Conductivity log UC4-GC7 had very high conductivities (>200 mS/m) from 0 to 1.22 m (0 to 4 ft). Based upon this electrical conductivity data, the muds from Pit 4C have well defined vertical boundaries.

The UC-4 Mud Pit C was determined statistically to be contaminated with TPH diesel/motor oil concentrations in excess of the PAL. TPH contamination was indicated within the 0.61-m (2-ft) sample intervals/layers between 0 - 0.61 m (0 - 2 ft) and 0.61 - 1.22 m (2 - 4 ft). A combined thickness of approximately 1.22 m (4 ft) of TPH-contaminated materials exists within the mud pit based on the average depth of refusal within each of the soil borings. Seven borings were advanced within the UC-4 Mud Pit C to depths ranging from 0.61 to 1.83 m (2 to 6 ft), at which point some borings met refusal. No TPH concentrations above the PAL was reported from the samples collected from the four borings outside the UC-4 Mud Pit C (U4C8, U4C9, U4C10 and U4C11). All borings advanced within the perimeter of the mud pit encountered 0.61-m (2-ft) intervals from the surface to refusal with combined TPH diesel/motor oil in excess of the PAL The highest combined TPH concentration of 985 mg/kg was reported within the 0 - 0.61 m (0 - 2 ft) interval in boring U4C5.

The last samples collected from the borings in Mud Pit U4C had TPH concentrations above the PAL. However, additional investigation of this pit is not considered necessary for the following reasons:

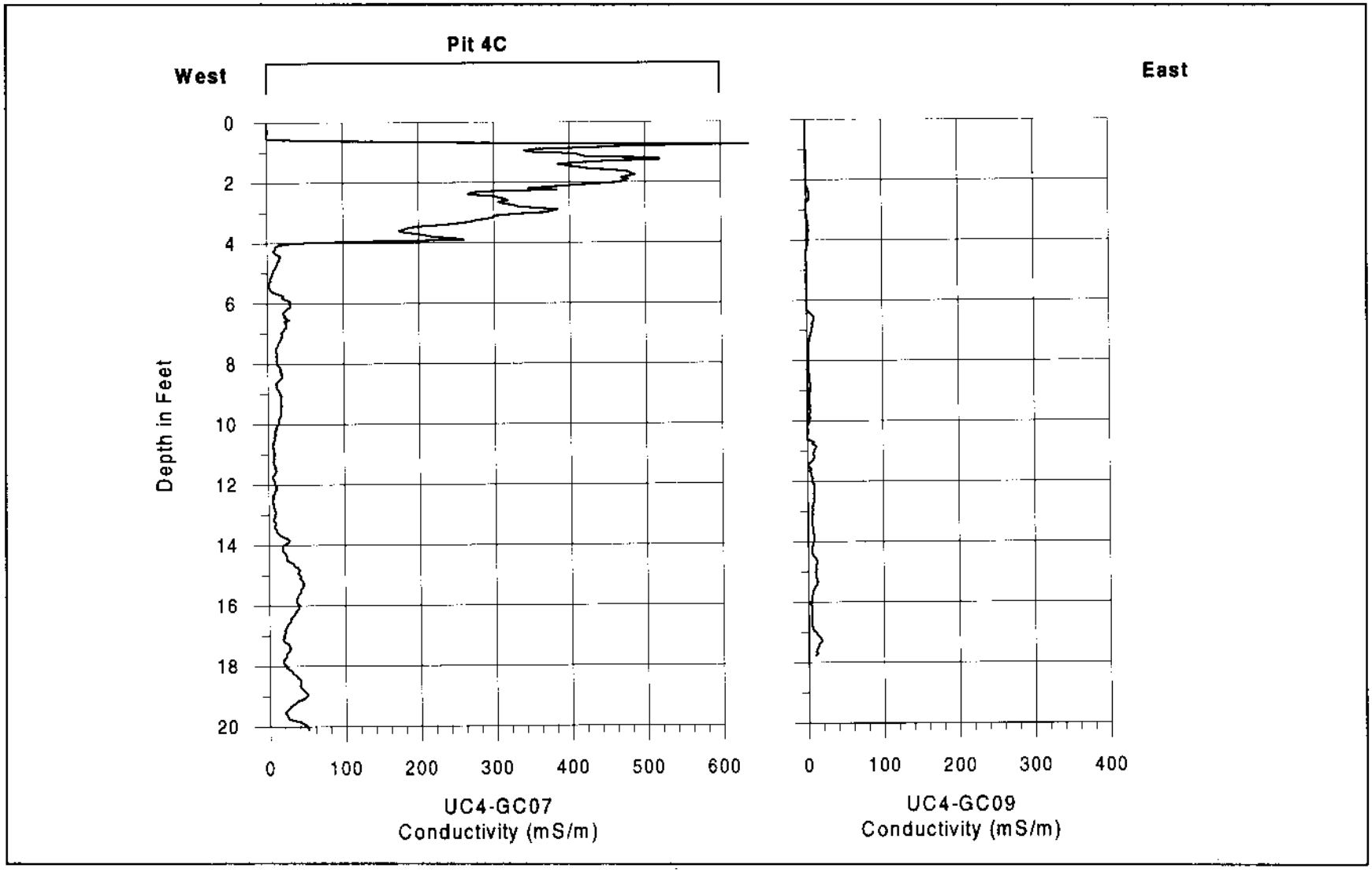


Figure D.4-12
UC-4 Mud Pit C East-West Cross Section
Showing Geoprobe™ Conductivity Profiles

- The borings in Mud Pit U4C were driven by hand and did not penetrate into the native material.

- The TPH concentrations found in the drilling mud samples from the U4C borings are similar in magnitude to the concentrations found in the drilling mud samples from Mud Pits U4A, U4B, and U4D.

- The samples of native material collected from immediately below the drilling mud/native material contact in Mud Pits U4A, U4B, and U4D had no TPH concentrations which exceeded the PAL so it can be inferred that the TPH contamination has not migrated below the drilling mud/native material contact at any of the mud pits.

A summary of the statistical evaluation is provided in Table D.4-1. Analytical results for soil samples including associated QA/QC samples collected at UC-4 Mud Pit C are provided in Attachment F. Figure D.4-8 provides the location of borings with TPH in excess of site action levels. Figure D.4-13 displays TPH data with respect to depth at all of the UC-4 Mud Pit C sampling locations.

Soil descriptions prepared by site geologists indicate the TPH-contaminated interval between 0 - 1.22 m (0 - 4 ft) occurs within a horizon of mixed wet to moist drilling muds and drill cuttings with some drilling muds. These drilling muds and mixed cuttings are visible at the surface of the mud pit and extend to depths ranging from 0.61 - 1.83 m (2 - 6 ft), where boring refusal was met within volcanic bedrock or tightly compacted soils.

Soil boring logs and cross sectional views of the completed borings within and near UC-4 Mud Pit C are presented in Attachment J.

The volume of TPH-contaminated materials contained within the UC-4 Mud Pit C occurs over a rectangular area measuring approximately 45.72 m (150 ft) in length by a width of 24.38 m (80 ft) with a thickness of 1.22 m (4 ft). Based on these dimensions the volume of TPH-contaminated material within the UC-4 Mud Pit C is calculated to be 1,359 m^3 (1,778 yd^3).

D.4.3.6 UC-4 Mud Pit D (CAS 58-09-03)

EM data in the area of UC-4 Mud Pit D do not indicate a distinct boundary or uniform conductivities as in the previously discussed pits. An area of elevated conductivities to the east of Mud Pit 4C (Figure D.4-5) was used to identify the location of UC-4 Mud Pit D along with

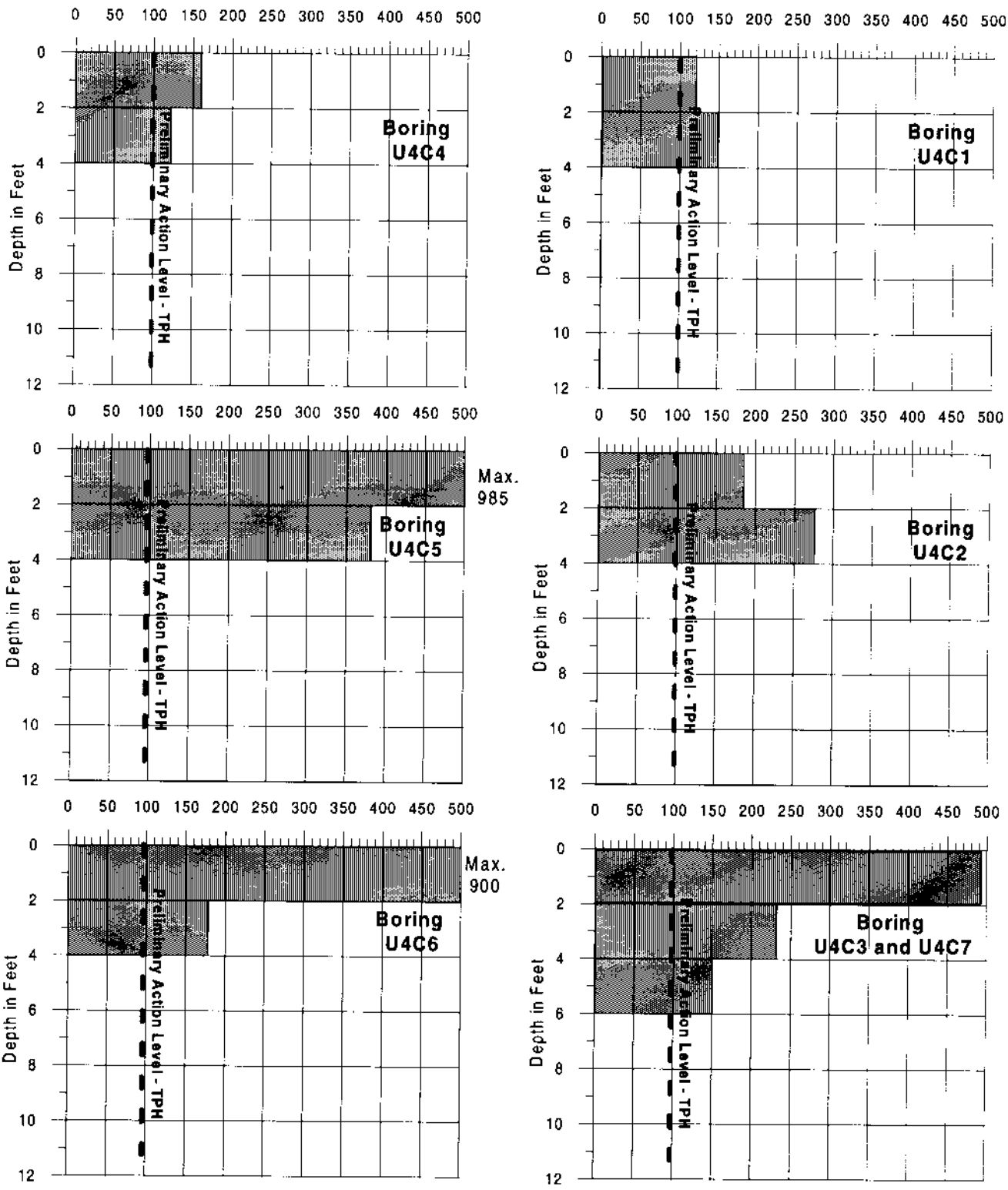


Figure D.4-13
UC-4 Mud Pit C
TPH Concentrations from Chemical Sampling

historical aerial photos. Mud Pit D lies within an area of what appears on the surface to be bentonite run-off and diesel residue. In-phase (metal) anomalies indicate the presence of metal in the northern portion of the pit (Figure D.4-6). Aerial photos (CN840 and CN841) show that this area appeared to be a sinuous settling basin and was not a primary mud pit.

Two Geoprobe™ conductivity logs (UC4-GC10 and UC4-GC11) were located in UC-4 Mud Pit D. Two additional conductivity logs (UC4-GC9 and UC4-GC12) were located just outside the UC-4 Mud Pit D, to the west and east, respectively. Figure D.4-14 shows a cross section of these four conductivity logs. Background conductivity values are seen in logs UC4-GC9 and UC4-GC12 outside the pit boundaries. Conductivity logs UC4-GC10 and UC4-GC11 indicate very high conductivities (>200 mS/m) from 1.83 - 3.35 m (6 - 11 ft).

The UC-4 Mud Pit D was statistically determined to be contaminated with TPH diesel/motor oil concentrations in excess of the PAL. TPH contamination above the PAL was indicated for the 0.61-m (2-ft) depth/layer intervals between 1.22 m and 3.05 m (4 ft and 10 ft). The total thickness of TPH-contaminated material within the mud pit is 1.83 m (6 ft).

Eight borings were advanced and sampled to depths of 3.66 and 4.27 m (12 and 14 ft) below the ground surface. Six borings were advanced within the mud pit, and two borings were advanced outside the mud pit. No TPH diesel/motor concentrations exceeding the PAL were reported in samples obtained from borings U4D7 and U4D8 located outside the mud pit. All borings advanced within the mud pit with the exception of U4D5 encountered intervals with combined TPH concentrations in excess of the PAL. The highest combined TPH concentration reported was 1,700 mg/kg and occurred within the 1.83 - 2.44 m (6 - 8 ft) interval in boring U4D1. TPH contamination was statistically below the PAL at each boring within the 0 - 1.22 m (0 - 4 ft) interval and within the 3.05 - 4.27 m (10 - 14 ft) interval.

Analytical results for soil samples including associated QA/QC samples collected at UC-4 Mud Pit D are provided in Attachment F. A summary of the statistical evaluation is provided in Table D.4-1. Figure D.4-8 provides the location of all eight borings including those with TPH diesel/motor oil in excess of the PAL. Figure D.4-15 displays TPH data with respect to depth at all of the UC-4 Mud Pit D sampling locations.

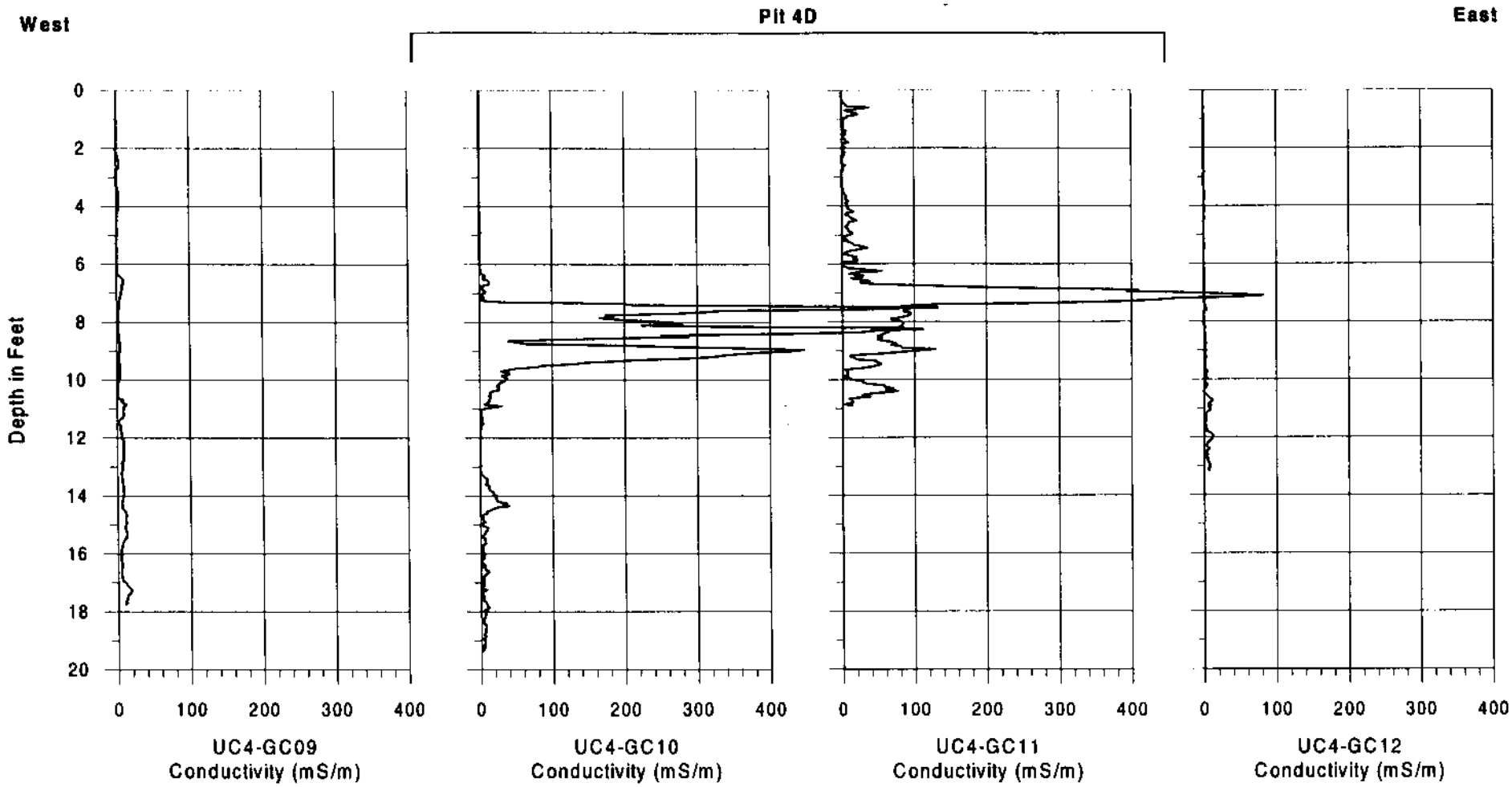


Figure D.4-14
UC-4 Mud Pit D East-West Cross Section
Showing Geoprobe™ Conductivity Profiles

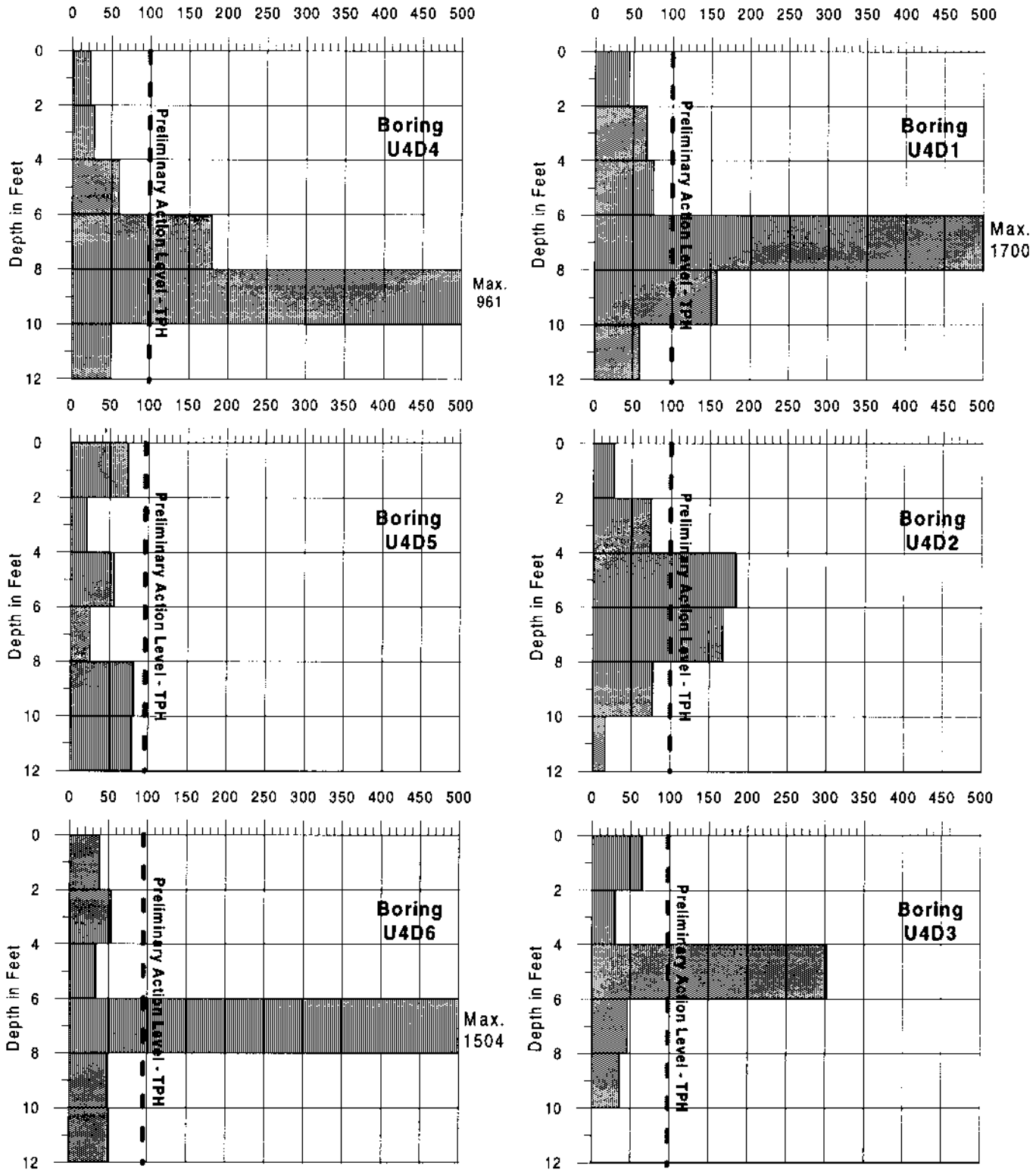


Figure D.4-15
UC-4 Mud Pit D
TPH Concentrations from Chemical Sampling

Soil descriptions prepared by the site geologists indicate the TPH-contaminated interval between 1.22 - 3.05 m (4 - 10 ft) occurs within a horizon of drill cuttings mixed with damp to moist drilling muds. The uncontaminated materials overlying the contaminated horizon between 0 - 1.22 m (0 - 4 ft) are native soils comprised of sandy gravels which were used as backfill. The underlying uncontaminated materials within the 3.05 - 4.27 m (10 - 14 ft) interval are composed of weathered volcanic bedrock.

Soil boring logs and cross-sectional views of soil borings completed within UC-4 Mud pit D are included in Attachment J.

The total volume of TPH-contaminated material contained within UC-4 Mud Pit D occurs over a rectangular area measuring approximately 54.86 m (180 ft) in length and 24.38 m (80 ft) in width with a thickness of 1.83 m (6 ft). Based on these dimensions the volume of TPH-contaminated material within the UC-4 Mud Pit D is calculated to be approximately 2,447 m^3 (3,200 yd^3).

D.4.3.7 UC-4 Shaker Pad Site (CAS 58-10-02)

Based on historic aerial photos, the shaker pad was north-northwest of the UC-4 emplacement well. Areas of high conductivity on the north side of the grid correlate with the observed shaker pad debris on the surface. The high conductivities strike along the west-east axis of the shaker pad drainage channel and extend off the site grid into the eastern drainage channel (Figure D.4-4).

A very distinct localized in-phase (metal) anomaly north-east of the shaker pad may represent buried metal within the drainage channel (Figure D.4-5). A pipe is evident in the in-phase (metal) data, and appears to have served to transport the shaker pad debris beneath the road. No other large areas of buried metal appear to be located within the shaker pad area.

A west-east cross section of eight Geoprobe™ conductivity logs extend through the axis of shaker pad debris observed at the surface and coincides with the high EM31 conductivity areas (Figure D.4-16). Conductivity logs UC4-GC19, UC4-GC20 and UC4-GC21 are within the highest surface conductivities around the shaker pad area, with UC4-GC19 and UC4-GC20 indicating elevated conductivities well above 200 mS/m. In all three logs, the highest conductivities occur between the surface and 2.13 m (7 ft). However, conductivity logs

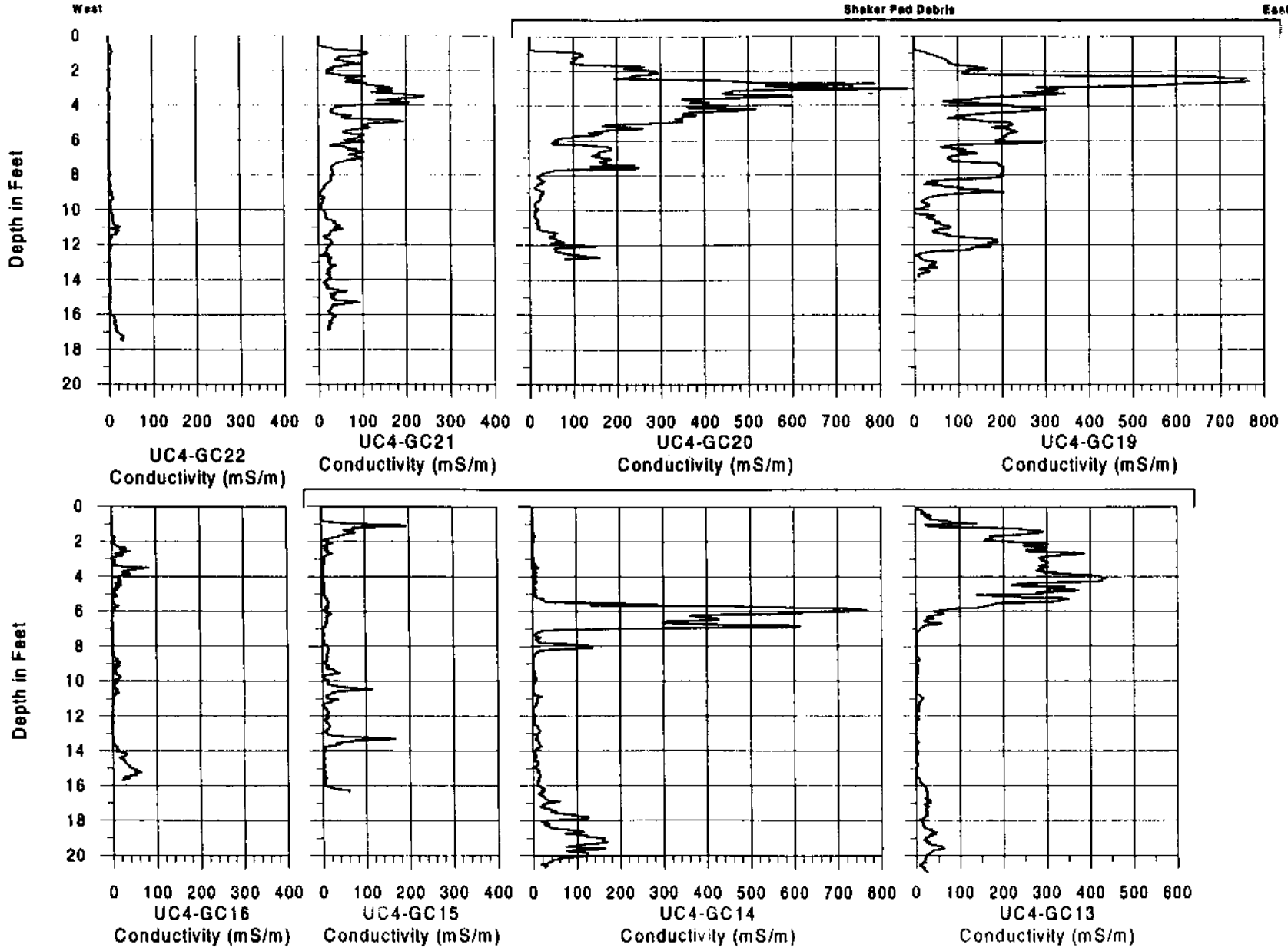


Figure D.4-16
UC-4 Shaker Pad Debris Area
East-West Cross Section Showing Geoprobe™ Conductivity Profiles

UC4-GC19 and UC4-GC20 also indicate higher than background conductivities extending to a depth of about 3.96 m (13 ft). Moving eastward, the conductivity logs return to almost background conditions until conductivity logs UC4-GC13 and UC4-GC14 which also have elevated conductivities (>200 mS/m). These conductivity logs are located within two separate high conductivity areas west and east of the dirt road, respectively. Log UC4-GC14 is west of the dirt road and indicates conductivities higher than 200 mS/m between 1.68 and 2.13 m (6 and 7 ft) deep and moderately high conductivities (50 to 150 mS/m) between 5.18 and 6.10 m (17 and 20 ft) deep. Log UC4-GC13 is east of the dirt road at the head of the valley extending to the east, and indicates conductivities higher than 200 mS/m between the surface and 1.83 m (6 ft) deep.

The configuration of the surface anomalies and the depth profiles suggest that the drilling mud in the shaker runoff area accumulated by in low-lying areas. At least three distinct areas of accumulation were identified from the geophysical data, in addition to the visible accumulations at the heads of the east and south drainage channels.

The UC-4 Shaker Pad Area located north of the UC-4 well site was statistically determined to be contaminated with TPH diesel/motor oil concentrations in excess of the PAL. TPH contamination was indicated in soil sampling from 0.61-m (2-ft) intervals between 0.61 - 1.22 m (2 - 4 ft) and 1.22 + 1.83 m (4 - 6 ft). The statistically determined total thickness of contaminated material within the shaker debris area is 1.22 m (4 ft).

Fourteen borings were advanced to investigate the UC-4 shaker area. Borings were advanced up to depths of 3.66 m (12 ft). Eight borings were advanced and sampled on 0.61-m (2-ft) intervals within areas of visible shaker debris material. Six borings were advanced and sampled in areas peripheral and outside visible debris to define the limit of contamination within the shaker debris areas. No TPH diesel/motor oil concentrations in excess of the PAL were reported for soil samples obtained from borings advanced outside the visible shaker debris area. Borings advanced within the visible shaker debris area encountered combined TPH concentrations in excess of the PAL. The highest combined TPH diesel/motor oil concentrations reported was 862 mg/kg which occurred in the 0.61 - 1.22 m (2 - 4 ft) interval in boring U4S6. This boring and boring U4S3 were the only borings containing samples in excess of action limits within the interval 0 - 0.61 m (0 - 2 ft). The TPH concentrations reported for this interval 0 - 0.61 m (0 - 2 ft) were 182.6 mg/kg for U4S6 and 273 mg/kg for U4S3. The deepest layer failed the test for the required number of samples to reach a statistically sound decision, even though the layer was below the

PAL, because of a single high value of TPH of 258 mg/kg at boring U4S6. This boring also had the highest TPH values at the shallower depths. In turn this layer was considered contaminated.

Analytical results for soil samples, including associated QA/QC samples collected at the UC-4 shaker area, are provided in Attachment F. A summary of the statistical evaluation is provided in Table D.4-1. Figure D.4-8 provides the location of borings with TPH in excess of site action levels. Figure D.4-17 displays TPH data with respect to depth at all of the shaker pad area sampling locations which contained at least one sample above the PAL.

Soil descriptions prepared by the site geologist indicate the TPH-contaminated intervals occur within a horizon of moist drilling muds with a basal layer of damp to moist sandy drill cuttings. Locally, TPH contamination was reported within intervals described as sandy soils such as boring U4S6. It is likely that some mixing of drilling mud/cuttings may have influenced the reported TPH diesel/motor oil concentration. Soil boring logs and cross sectional views for borings completed within UC-4 shaker pit are presented in Attachment J.

The total TPH-contaminated material in the UC-4 Shaker Pad Area occurs over an irregular area within a shallow natural drainage. The area of shaker debris measures approximately 182 m (600 ft) in length with variable widths estimated at 24.38 m (80 ft) with a thickness of 1.22 m (4 ft). Based on these dimensions the volume of contaminated material within the UC-4 Shaker Pad Area is calculated to be 5,439 m^3 (7,111 yd^3).

D.4.3.8 UC-4 Area W (CAS 58-10-04)

The UC-4 Area W (CAS 58-10-04) consists of the shaker debris material located within a drainage approximately 153 m (502 ft) south of the UC-4 well site. Four borings were advanced to characterize this site; TPH contamination was encountered in only one boring, U4W1, from 0 to 2.44 m (0 to 8 ft). The highest combined TPH concentration encountered in this boring occurred within the interval 1.22 - 1.83 m (4 - 6 ft) with a reported value of 301.3 mg/kg.

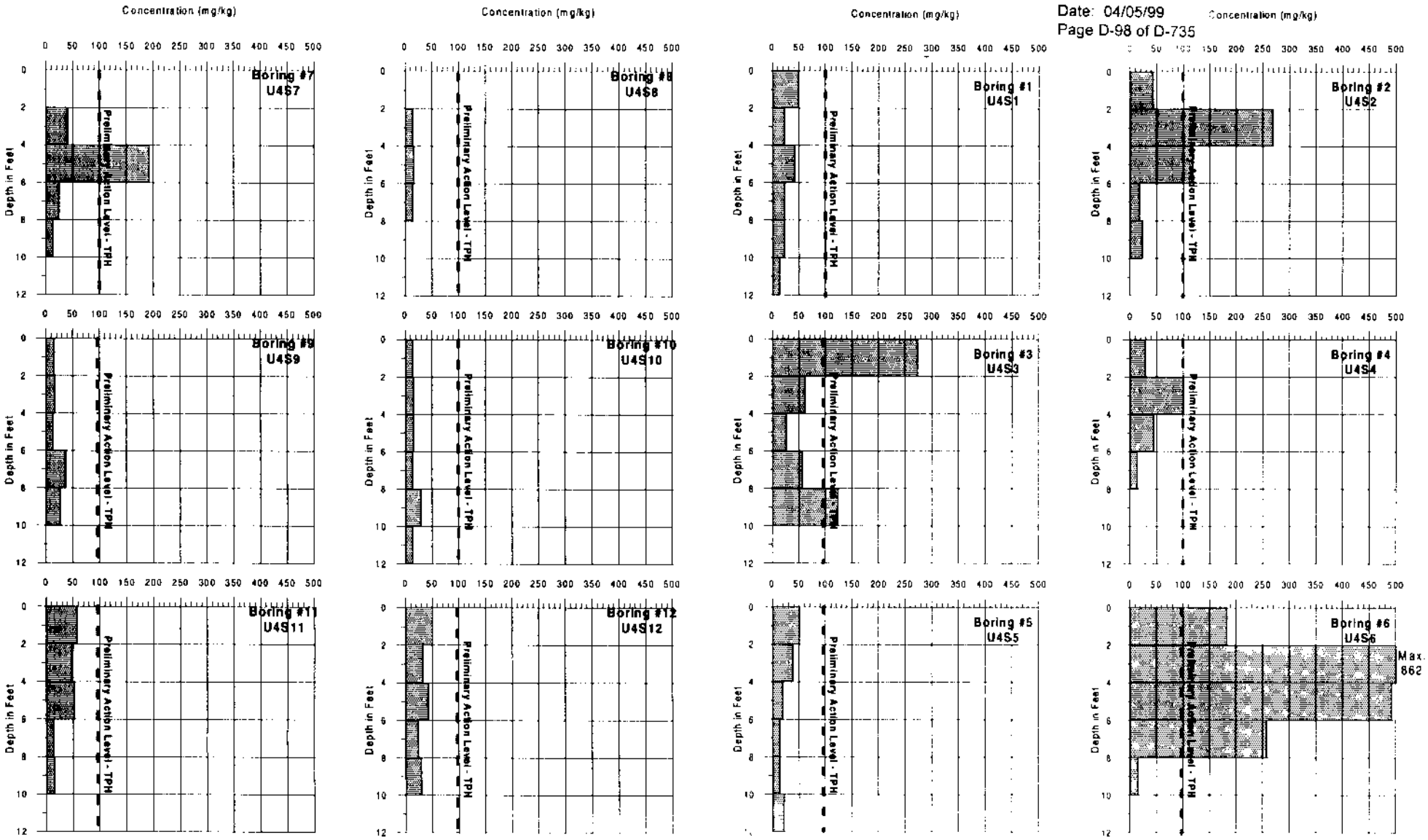


Figure D.4-17
UC-4 Area S, Shaker Pad Debris Area
TPH Concentrations from Chemical Sampling

Boring U4W1 was located within a pile of accumulated drilling mud and cuttings located at the upgradient end of the debris. The other three downgradient borings (U4W2, U4W3, and U4W4) were located in material visibly eroded from the accumulation pile, and all had TPH values well below the PAL from 0 - 1.22 m (0 to 4 ft). Figure D.4-18 displays TPH data with respect to depth at all of the Area W sampling locations.

The volume of TPH-contaminated material within the UC-4 Area W occurs over an irregularly shaped area approximately 12.19 m (40 ft) in length and 12.19 m (40 ft) in width with a depth of 2.44 m (8 ft). Based on these dimensions the total volume of TPH-contaminated material within the UC-4 Area W is calculated to be approximately 362 m^3 (474 yd^3).

D.4.3.9 UC-4 Area X (CAS 58-10-05)

UC-4 Area X (CAS 58-10-05) consists of a shaker debris pile and outflow cuttings/drilling mud debris located within a natural drainage approximately 199.64 m (655 ft) east of UC-4 Well. Four borings were advanced to investigate this site. Boring U4X1 had a reported TPH value above the PAL of 131.2 mg/kg. in the 1.22 - 1.83 m (4 - 6 ft) interval.

Boring U4X1 was located within a pile of accumulated drilling mud and cuttings located at the upgradient end of the debris. Downgradient borings (U4X2, U4X3, and U4X4) were located in material visibly eroded from the accumulation pile, and all had TPH values below the PAL from 0 - 1.22 m (0 to 4 ft). Figure D.4-19 displays TPH data with respect to depth at all of the Area X sampling locations.

The volume of TPH-contaminated material within the UC-4 Area X occurs over an irregular shaped area approximately 12.19 m (40 ft) in length and 12.19 m (40 ft) in width with a depth of 0.61 m (2 ft). Based on these dimensions the total volume of TPH-contaminated material within the UC-4 Area X is estimated to be 90.6 m (119 yd^3).

D.4.3.10 UC-4 Well Area Uncontaminated Sites of Investigation

Two sites in the UC-4 area did not contain COCs in excess of the PAL, UC-4 Mud Pit E within CAS 58-09-03 and site U4Y. The conductive anomaly detected by surface geophysical measurements at U4Y was found to be a metallic object. All other mud pits included in this CAS had concentrations of TPH diesel/motor oil in excess of the PAL. Soil borings logs, cross-sectional views, and maps of these borings are provided in Attachment J.

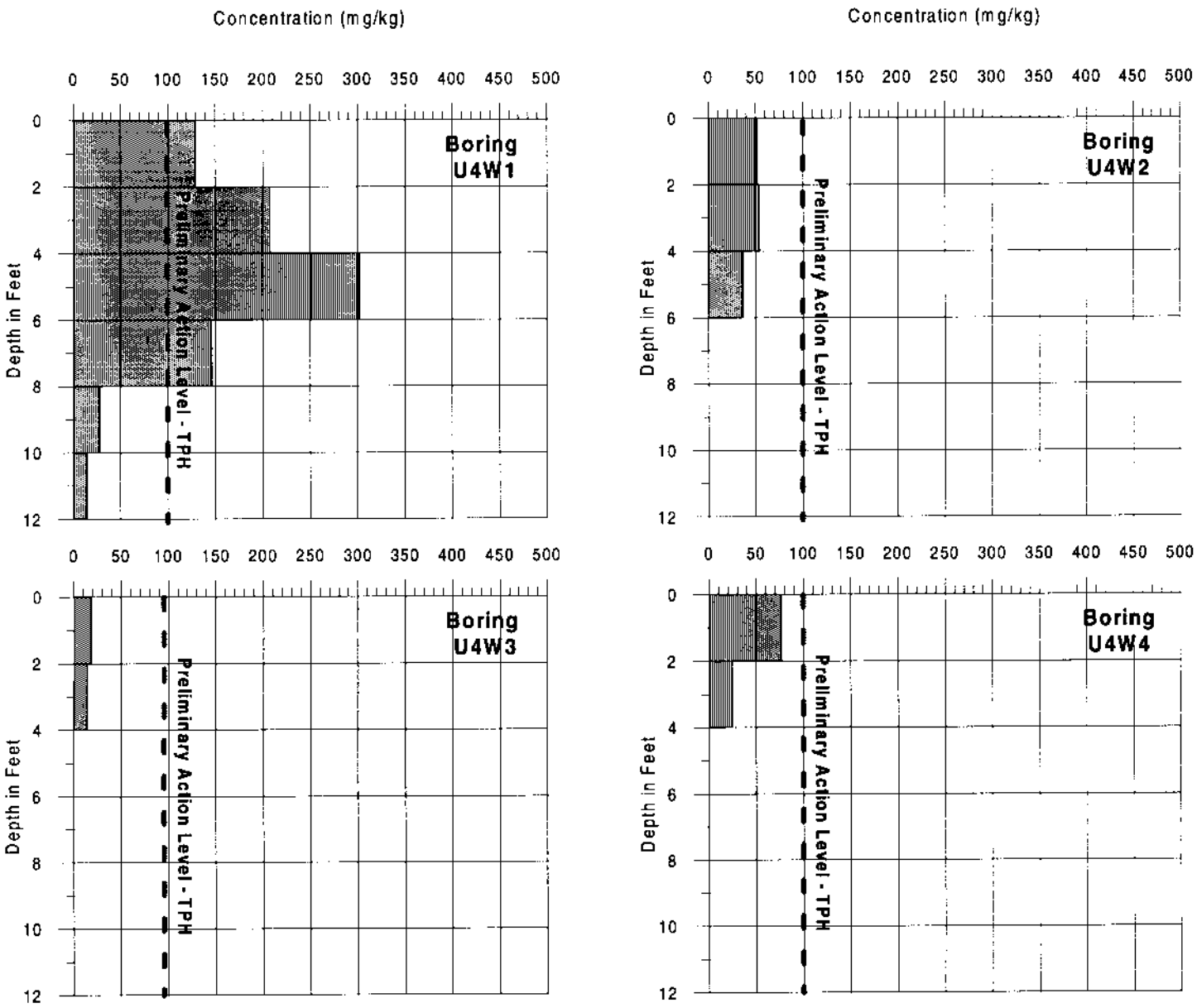


Figure D.4-18
UC-4 Area W
TPH Concentrations from Chemical Sampling

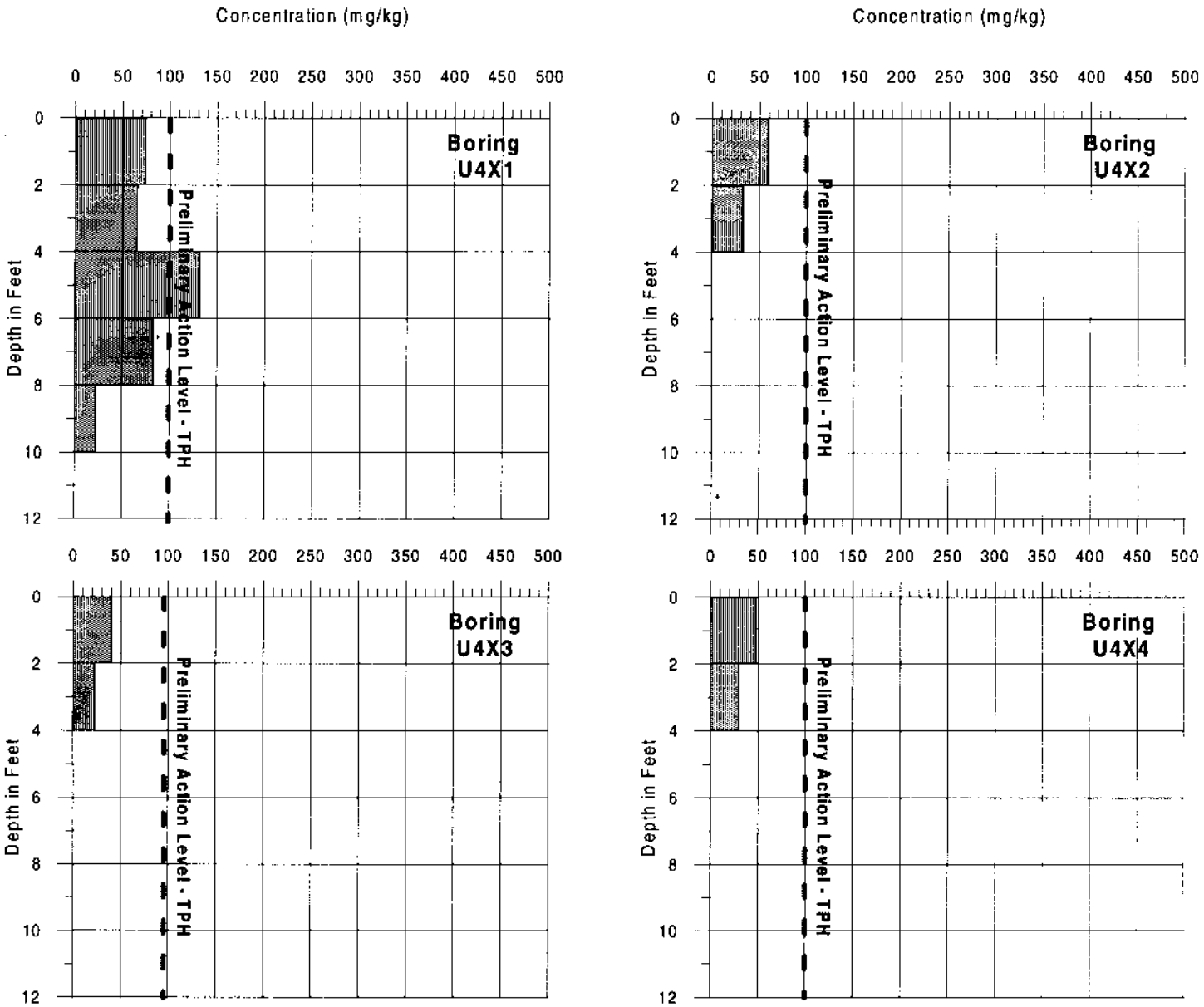


Figure D.4-19
UC-4 Area X
TPH Concentrations from Chemical Sampling

D.5.0 UC-3 Well Area Investigation

The UC-3 well area is the southern-most of the drilling sites within the CNTA project area. The UC-3 area was the location of several well drilling and completion operations, most notable of which was the UC-3 emplacement well. The UC-3 well was drilled and completed for use as an emplacement hole for an underground nuclear device; however, it was never used. Several other wells were drilled and completed in the vicinity of well UC-3 which served as exploratory, instrument test, cannister, and hydrologic test wells. Most of these wells were plugged and abandoned in accordance with applicable requirements when the site was decommissioned (AEC, 1973a). The wells which were not plugged were turned over to the BLM for their use (AEC, 1973a). No further work is planned on these wells. Areas suspected of surface contamination were directly related to the well drilling and completion operations of these wells. Suspected areas include mud pits, shaker debris areas, and areas of shaker debris disposal (see Figure D.5-1). Five CASs were identified within the CAIP for investigation in the UC-3 well area. Several additional sites were investigated based on proximity to areas of suspected or known contamination and visual observation that suggested potential for surface contamination.

D.5.1 Purpose

Surface investigations within the UC-3 well area were conducted to evaluate the COCs within the five defined CASs and two additional sites suspected of having contamination. The vertical and lateral extent of identified contamination would be defined for each of the sites.

D.5.2 Scope of Work

The surface investigation and surface sampling of five CASs and two additional suspected sites was conducted from May 18 through 21, 1997, and on May 30, and 31, 1997. Additional work was conducted on June 1, 3, 4, and 5 1997, and again on June 7 and 8, 1997. A total of 12 days were spent advancing soil borings and collecting soil samples from sites within the UC-3 well area. Investigated sites are listed below and include mud pits, shaker debris areas, drill mud/grout spill areas, and a possible diesel fuel spill area.

- UC-3 Mud Pits A through E (CAS 58-09-06)
- Area U3S - Shaker Pad Area northeast of UC-3 (CAS 58-10-01)
- Area U3Z - Drill Mud/Grout Spill Area southeast of UC-3 (CAS 58-44-03)
- Area U3Y - Drill Mud/Grout Spill Area southwest of UC-3 (CAS 58-44-04)
- Area U3U - Potential UST With Two Protruding Pipes East of UC-3 (CAS 58-99-01)
- Area U3X - Shaker Debris Disposal Area north of UC-3 (CAS 58-10-06)
- Potential Diesel Spill Area UC-3 Mud Pit E southern outlier (CAS 58-25-01)

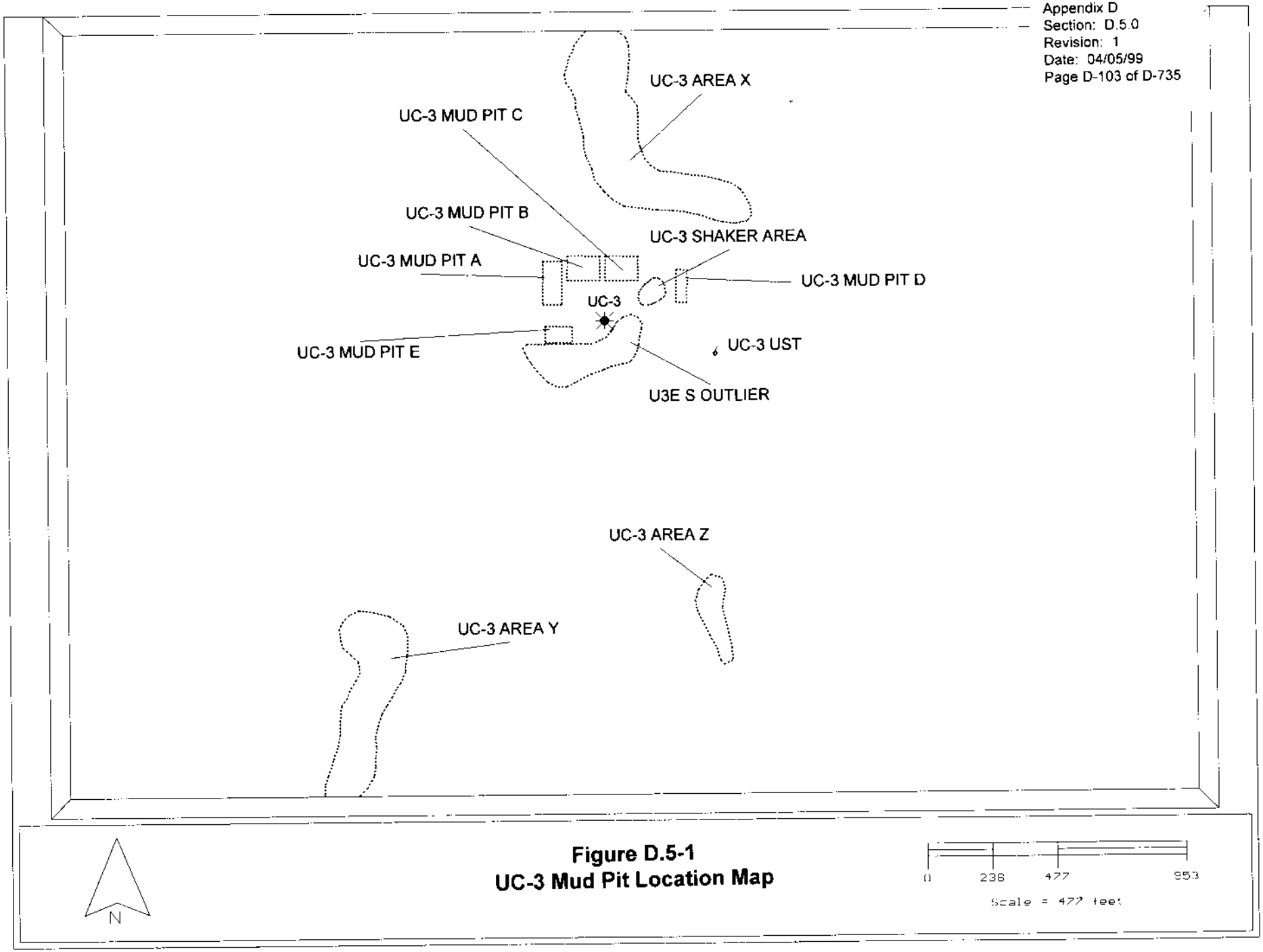


Figure D.5-1
UC-3 Mud Pit Location Map

Prior to conducting investigative work within the UC-3 well area, a survey grid was established over all the sites to be investigated. A translation error was noted in the location of grid points during the location of soil borings within sites of investigation at UC-3. The coordinates for the grid corner points were found to be one grid spacing 12.19 m (40 ft) too far to the west. Changes were made to the grid points to correct this translation error.

D.5.2.1 Survey Grid and Elevations

A survey grid was established over an area of 231.65 x 182.88 m (760 x 600 ft) (Figure D.5-2). The extent of the grid was selected to include all of the mud pits and key features of the site. Aerial photos, existing drawings (primarily from the CAIP), and on-site observations were used to select the boundaries of the grid. It was not feasible to include some outlying features within the grid.

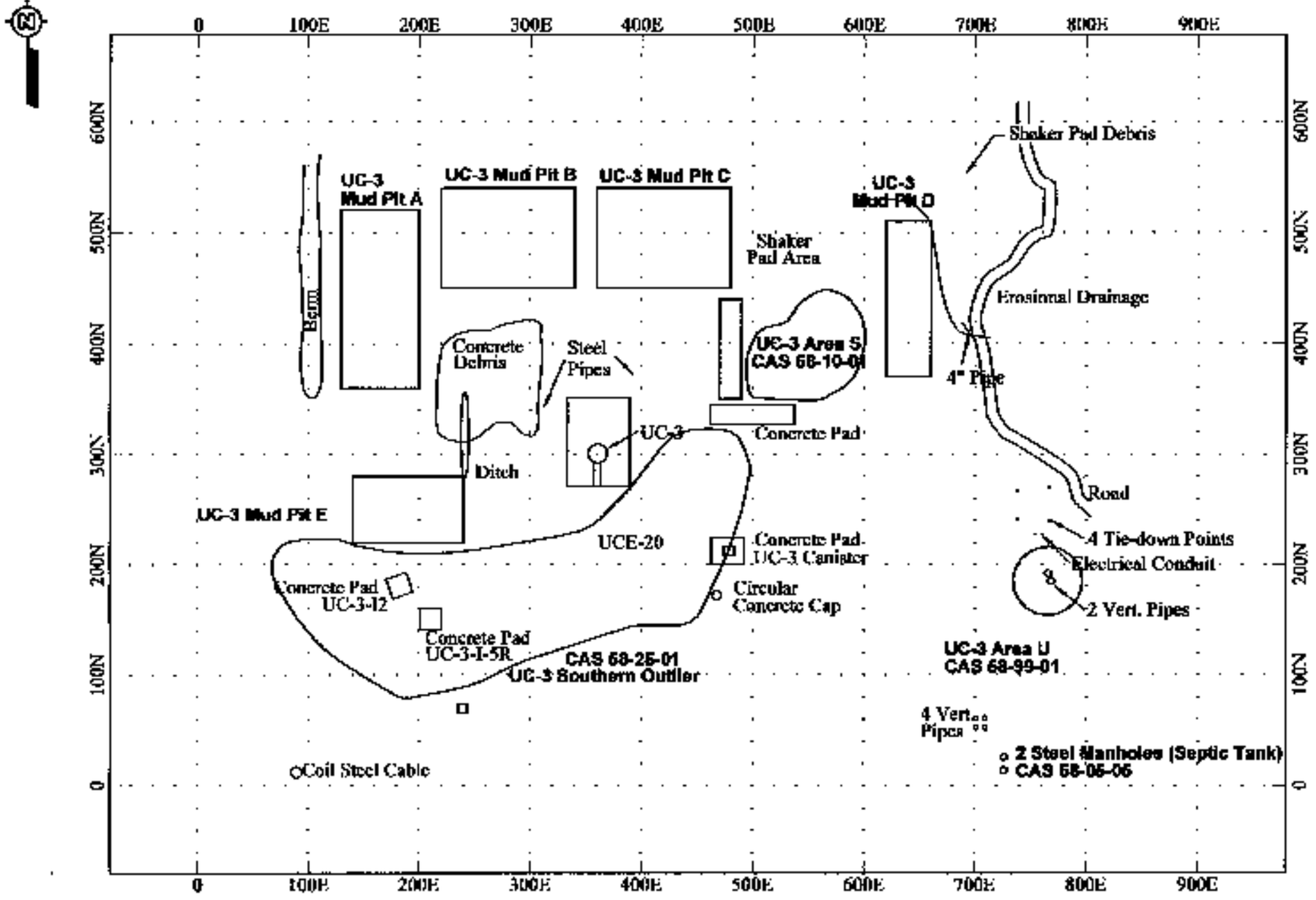
All field observations, measurements and coordinates given in the following text are referenced to the grid northing and easting coordinates in feet. Local grid coordinates were translated into UTM coordinates during field operations for compatibility with existing DOE databases. See Attachment A for a table of control points for the UC-3 area.

Digital elevation data were acquired for 375 stations over the entire grid generally at approximately a 12.19-m (40-ft) sample spacing. Attachment H includes the elevation map for UC-3. Elevations at UC-3 range from 1,754 to 1,758 m (5,754 to 5,769 ft) and average 1,756 m (5,761 ft). Details regarding elevation data collection are given in Attachment B.

D.5.2.2 On-site Observations

Figure D.5-2 shows the observed locations of various site features relative to the rectangular grid established at the site. The suspected position of the mud pits and shaker pad shown in this and other figures are based upon CAIP drawings and aerial photos of the site. The UC-3 emplacement hole is located roughly at the center of the site. The UC-3 pad contains a manhole leading to a water-filled hole of unknown extent which will be dealt with when the UC-3 borehole is closed. Five separate concrete pads for monitoring wells and the UC-3 Canister hole surround the emplacement hole.

Scrap metal, partially buried valves, metal cables, and pipes were observed throughout the site. All of the scrap metal which could be removed without conducting major excavations was



EXPLANATION

Mud Pit

NOTE

UC-3 Mud Pits A, B, C, D, and E are all CAS 58-09-06

SCALE

0 100 200 Feet

0 40 80 Meters

Figure D.6-2
UC-3 Area Location Map
Showing Site Features

removed during the 1998 field effort (DOE/NV, 1998). An erosion channel runs through the northeastern portion of the grid, and four vertical pipes and two steel manholes leading to a septic tank are located in the southeastern portion of the grid. Two small, vertical steel pipes, four tie-down points, and an electrical conduit were observed on the eastern edge of the grid. These sites were investigated during the 1998 field investigation, see the addendum to the Corrective Action Investigation Report (CAIR) (DOE/NV, 1998).

Piles of drill cuttings and mud were observed both within the grid and at outlying areas. No obvious drainage or piping system was observed as a means to transport this material from the shaker to the outlying areas; therefore, it is thought that the material was distributed by truck primarily to three outlying areas (north, southeast, and southwest of the grid; [Figure D.5-3]).

D.5.2.3 Surface Geophysics

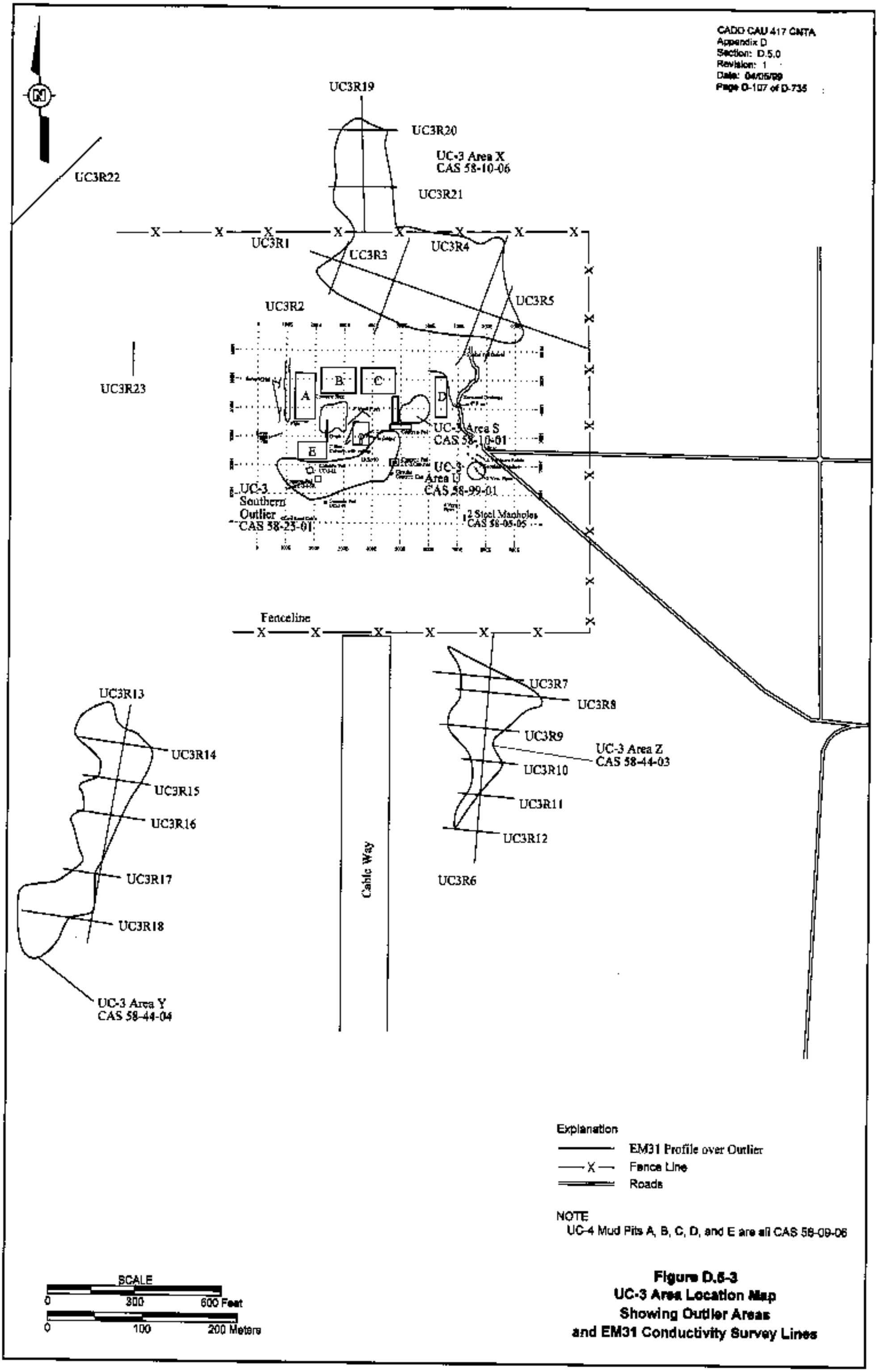
EM31

EM31 data were acquired over seven areas including:

- The site grid, along parallel lines oriented south-north with a line separation of 6.10 m (20 ft) (Figure D.5-4)
- An extension of the grid to the east, in the southeast corner of the grid with a line separation of 3.05 m (10 ft) oriented both south-north and west-east
- An area of drilling muds southwest of the grid UC-3 Area Y (CAS 58-44-04). Outlier profiles UC3R13-UC3R18 are within this area (Figure D.5-3)
- An area of drilling muds southeast of the grid UC-3 Area Z (CAS 58-44-03). Outlier profiles UC3R6-UC3R12 are within this area (Figure D.5-3).
- An area of drilling muds north of the grid UC-3 Area X (CAS 58-10-06). Outlier profiles UC3R1-UC3R5 and UC3R19-UC3R21 are within this area (Figure D.5-3).
- Two smaller piles of apparent drill cuttings west and northwest of the grid. A single outlier profile covers each area, UC3R22 and UC3R23.

Magnetometer/Metal Detector Pipe Locator

A magnetometer and metal detector pipe locator were used in the area of vertical pipes in the southeast portion of the grid and the grid extension. These instruments were used to identify potential underground storage tanks and trace suspected pipelines.



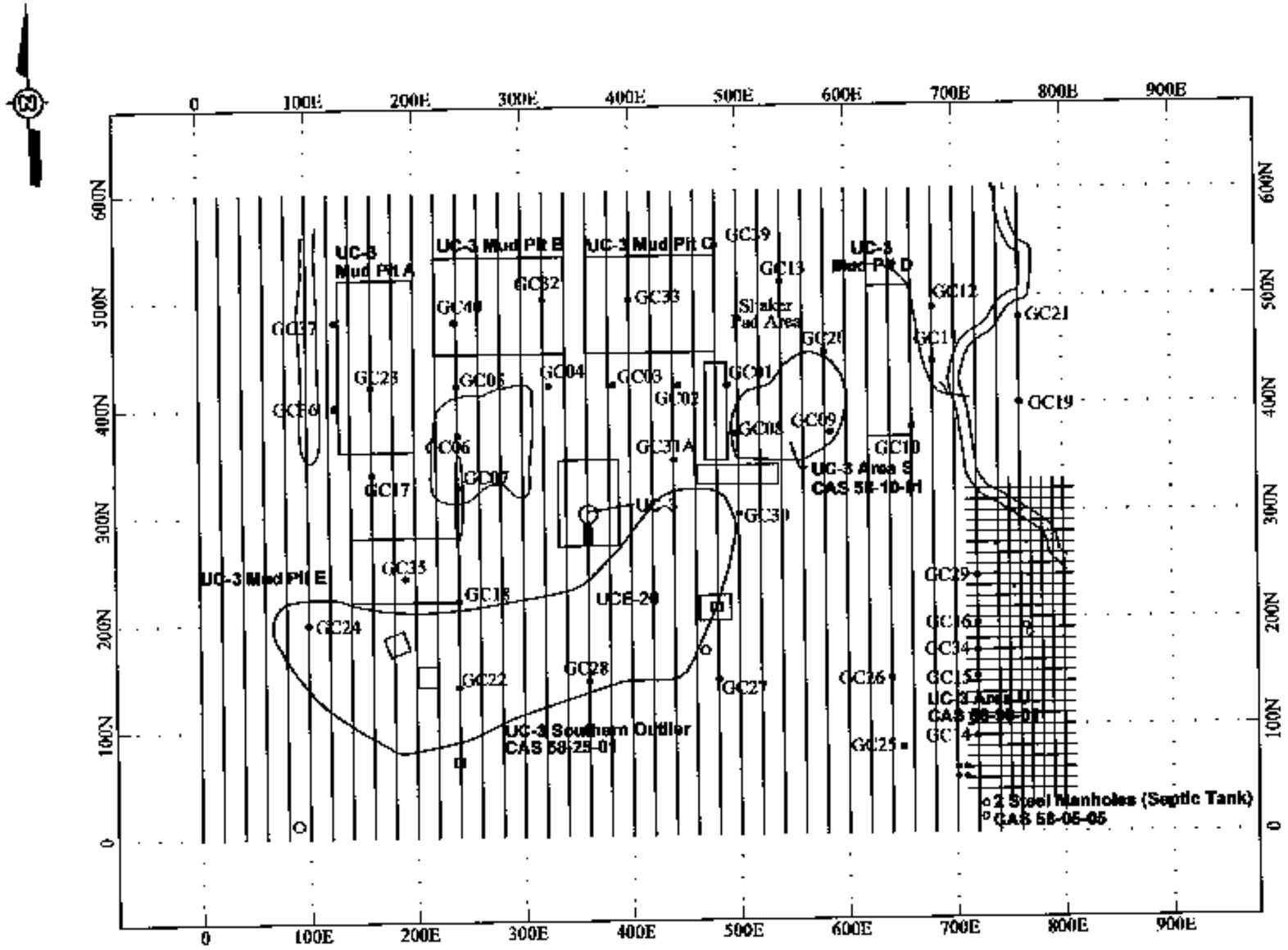
Explanation

- EM31 Profile over Outlier
- —X— Fence Line
- Roads

NOTE
UC-4 Mud Pits A, B, C, D, and E are all CAS 58-09-06

SCALE
0 300 600 Feet
0 100 200 Meters

Figure D.5-3
UC-3 Area Location Map
Showing Outlier Areas
and EM31 Conductivity Survey Lines



EXPLANATION

- Mud Pit
- EM31 Survey Lines
- Geoprobe Conductivity Boring
- Location of Eastern Extension of 3M31 IN-Phase Metal Survey, and Surface Conductivity Maps (See Figures 5-7 and 5-8)

NOTE
UC-3 Mud Pits A, B, C, D, and E are all CAS 58-09-06

SCALE
0 100 200 Feet
0 40 80 Meters

Figure D.5-4
UC-3 Area Location Map Showing
Geoprobe™ Conductivity Borings and EM31 Survey Lines

D.5.2.4 Geoprobe™ Conductivity Logs

Geoprobe™ conductivity logs were acquired at 40 locations within the grid. Locations are shown in Figure D.5-4 and are labeled sequentially UC3-GC01 through UC3-GC40. Plots of all conductivity logs completed are included in Attachment E.

D.5.2.5 Chemical Sampling and Analysis

Seventy-eight soil borings were completed within the UC-3 area of investigation. Attachment I provides the coordinates of the soil borings. Borings ranged in depth from 2.44 to 5.49 m (8 to 18 ft). The initial six borings within the five UC-3 area mud pits (A through E) were located as specified in the CAIP. Each mud pit was divided into six roughly area sections by bisecting the mud pit along its long axis and trisecting the mud pit in the short dimension. A boring was located near the center of each of the sections. Borings within non-mud pit sites such as shaker debris areas were located within areas of visible drilling related materials.

Soil samples collected from individual borings were submitted to on- and off-site laboratory facilities for analysis. There were 382 samples collected and analyzed for the investigation/characterization of CASs and suspect areas within the UC-3 well area. These samples were submitted to the on-site laboratory facilities for the analysis of chromium (total and hexavalent) and TPH diesel/motor oil. Waste characterization and mud pit characterization samples were collected and submitted to off-site laboratories as described in Section 1.2.3, "Phase 2 Work Scope."

A total of three waste characterization/mud pit characterization samples were obtained from the UC-3 Mud Pit E site. These waste characterization samples were collected from borings advanced within the mud pit for purposes of IDW disposal and mud pit characterization. The location of these borings and the sample intervals were determined from previously completed ESC investigation-related borings.

D.5.3 Summary of Results

The following sections provide the results of surface geophysical investigations and chemical sampling and analysis for the UC-3 Area.

D.5.3.1 Geophysical Measurements

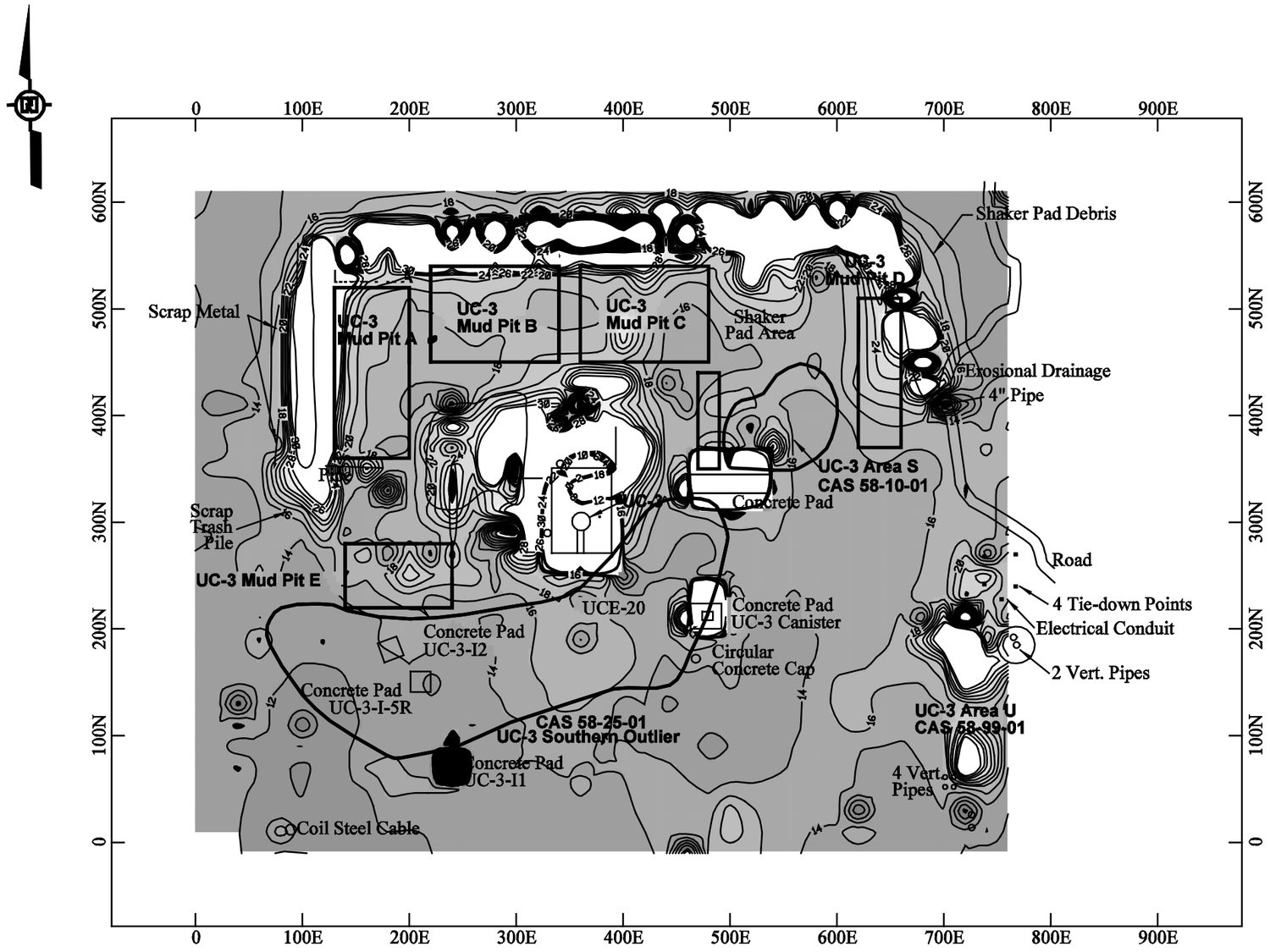
The EM31 conductivity and in-phase (metal) data are contoured and presented in Figures D.5-5 and D.5-6. Background terrain conductivity values for UC-3 are approximately 12-16 mS/m. A large conductivity and in-phase (metal) anomaly is associated with the UC-3 well and surrounding reinforced concrete pad (CAS 58-30-01) and is in the approximate center of the grid. The anomaly extends 18.29 m (60 ft) north of the pad, which indicates the presence of additional subsurface metal to the north. Large in-phase (metal) and conductivity anomalies are associated with reinforced concrete pads. Smaller anomalies are associated with reinforced concrete pads at wells UC-3-11 and UC-3-1-5R.

A large, continuous conductivity anomaly (>40 mS/m) trends south to north in the northwest portion of the site (Figure D.5-5). The anomaly follows the path of a berm (formerly used as a road based on historical photos) and shows an in-phase (metal) response at its northern end. Scrap metal was observed at the surface along the western portion of the anomaly.

A continuous west to east trending high conductivity and in-phase (metal) anomaly lies at the north end of the grid (Figures D.5-5 and D.5-6). The anomaly has a signature that would indicate a buried pipe. There is a sign on the surface at the west end of the anomaly that reads, "Buried Cable," but the anomaly is much larger than would be expected from a single utility cable. A large valve handle was observed in the field at about the midpoint of the anomaly which joins the two conductivity anomalies in the northeast and northwest portions of the grid. Follow-up work with a magnetometer has indicated that this is very likely a pipeline that turns south at both the western and eastern ends. On the western end, the pipeline appears to run south almost to UC-3 Mud Pit E. On the eastern end, the pipeline appears to run south, to the side of the drainage channel.

The estimated locations of Mud Pits B, C, E, and the shaker pad show little to no elevated conductivities. This may be due to the remaining muds having been removed from the site during demobilization in the early 1970s. Some historic photos of the UC-3 area show a structure over the UC-3 canister hole and an asphalt surface over the surrounding area. This may indicate that a thorough cleanup of the site, possibly including remains of drilling mud in the pits, occurred in preparation for the planned detonation at UC-3.

An extension of the survey grid toward the east was added during Phase 1B. The purpose was to survey the area with EM-31 in order to evaluate a large anomaly found at the east edge of the



28 - 30
26 - 28
24 - 26
22 - 24
20 - 22
18 - 20
16 - 18
14 - 16
12 - 14
10 - 12
8 - 10
6 - 8
4 - 6
2 - 4
0 - 2
Below 0
mS/m

EXPLANATION

Mud Pit
Conductivity Contours

NOTE
UC-4 Mud Pits A, B, C, D, and E are all CAS 58-09-06

SCALE
0 100 200 Feet
0 40 80 Meters

Contour Interval = 2 mS/m

Figure D.5-5
UC-3 Area
EM31 Surface Conductivity Map

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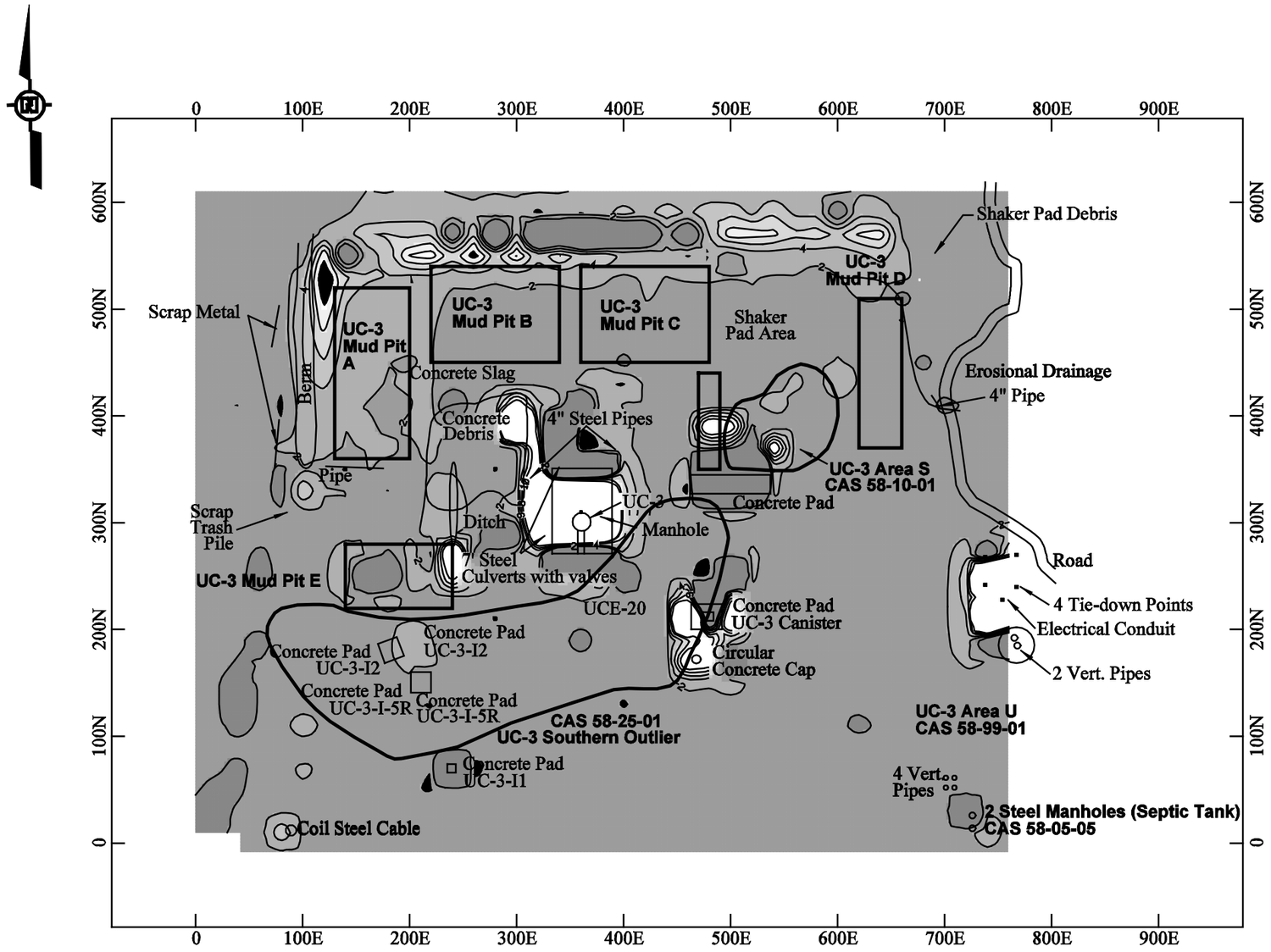
12 MAY 1999



8 - 10
6 - 8
4 - 6
2 - 4
0 - 2
Below 0
ppt

EXPLANATION

Mud Pit
In-phase Contours

NOTE
UC-3 MUD Pits A, B, C, D, and E are all CAS 58-09-06

SCALE
0 100 200 Feet
0 40 80 Meters

Contour Interval = 2 ppt

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12 MAY 1999

Figure D.5-6
UC-3 Area
EM31 In-Phase Metallic Anomoly Map

original survey, northeast of the protruding pipes. Conductivity profiles of the extension are shown in Figure D.5-7, and in-phase (metal) contours are shown in Figure D.5-8. The anomaly seen in Figure 5-8 is the septic tank investigated in 1998, see the CAIR Addendum (DOE/NV, 1998).

D.5.3.2 Chemical Sampling and Analysis

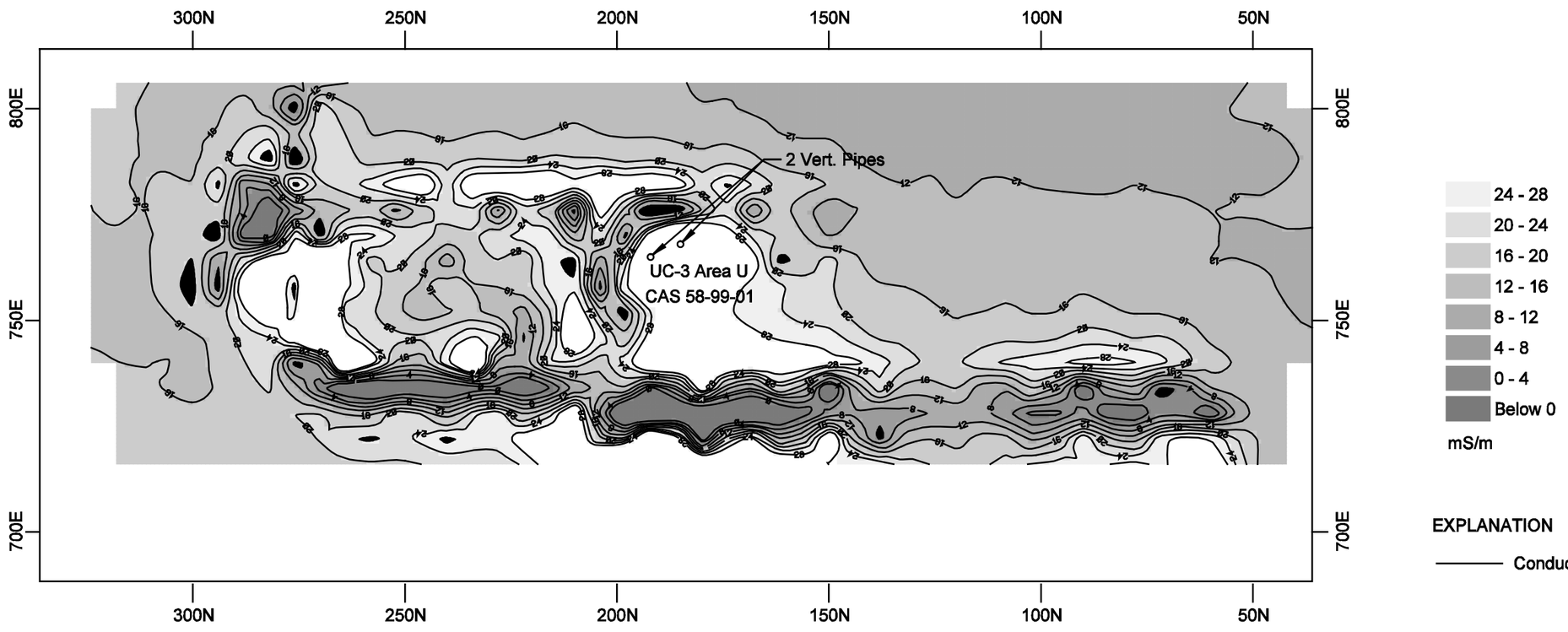
The UC-3 well area contained seven sites of investigation. Composite soil samples were collected from borings advanced at these sites. Based on analytical results covering 0.61-m (2-ft) depth intervals, three of these sites (Mud Pit E, U3S, and U3Z) were determined statistically to contain volumes of material with TPH diesel/motor oil concentrations in excess of the PAL. Two of these sites (U3X and U3Y and Mud Pits A through D) did not have any layers above the PAL. The remaining two sites (U3U and UC-3 Mud Pit E Southern Outlier area were outside the Pit/Pad areas and were found to have TPH above the PAL. No samples collected from any of the sites investigated contained chromium in the hexavalent state in excess of the PAL. No radionuclides exceeding background activities were noted during field surveys or in samples submitted for off-site analysis for radiological constituents.

The following sections describe the extent and nature of contamination within sites that were determined statistically to contain contaminates of concern in excess of site action levels. The final section addresses those investigated sites that did not have contaminates above the PALs.

D.5.3.3 UC-3 Shaker Debris Area (CAS 58-10-01)

No evidence of a shaker pad was observed on the surface of the site within the grid. Based on aerial photos, the shaker pad is interpreted to be located northeast of the UC-3 emplacement well (Figure D.5-2). No EM31 conductivity anomalies are evident immediately surrounding this location; however, the conductivity anomaly in the northeastern portion of the grid may be related to shaker pad debris.

Two Geoprobe™ conductivity logs (UC3-GC1 and UC3-GC8) were located just on the eastern edge of the shaker pad. Log UC3-GC1, to the north, shows several layers of high conductivity often greater than 100 mS/m, but over depth intervals less than 0.61 m (2 ft). The southern log UC3-GC8 indicates background conductivities throughout its depth. These two logs are shown in Figure D.5-9. These localized increases are likely due to natural clays and silts or increases in moisture content.



SCALE
0 30 60 Feet
0 10 20 Meters

Contour Interval = 4 mS/m

Figure D.5-7
UC-3 Area
EM31 Surface Conductivity Map of Eastern Extension

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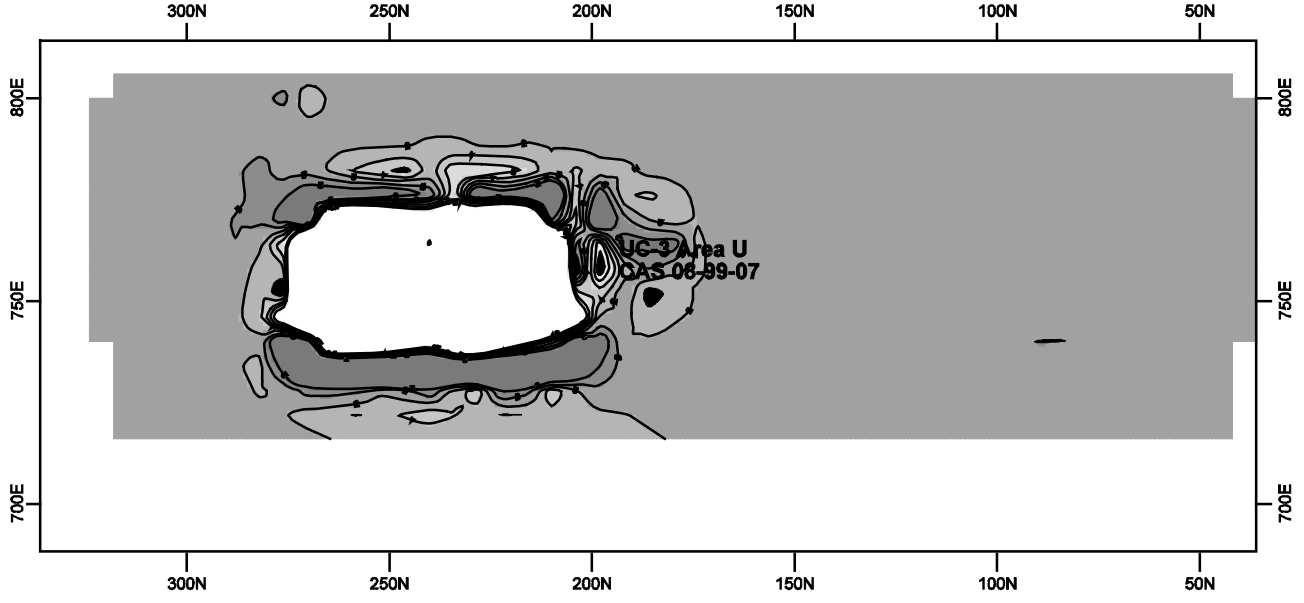

8 - 10
6 - 8
4 - 6
2 - 4
0 - 2
-2 - 0
Below -2
ppt

EXPLANATION
In-Phase Contours

SCALE
0 30 60 Feet
0 10 20 Meters

Contour Interval = 2 ppt

Figure D.5-8
UC-3 Area
EM31 In-Phase Metal Survey
Eastern Extension

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12 MAY 1999

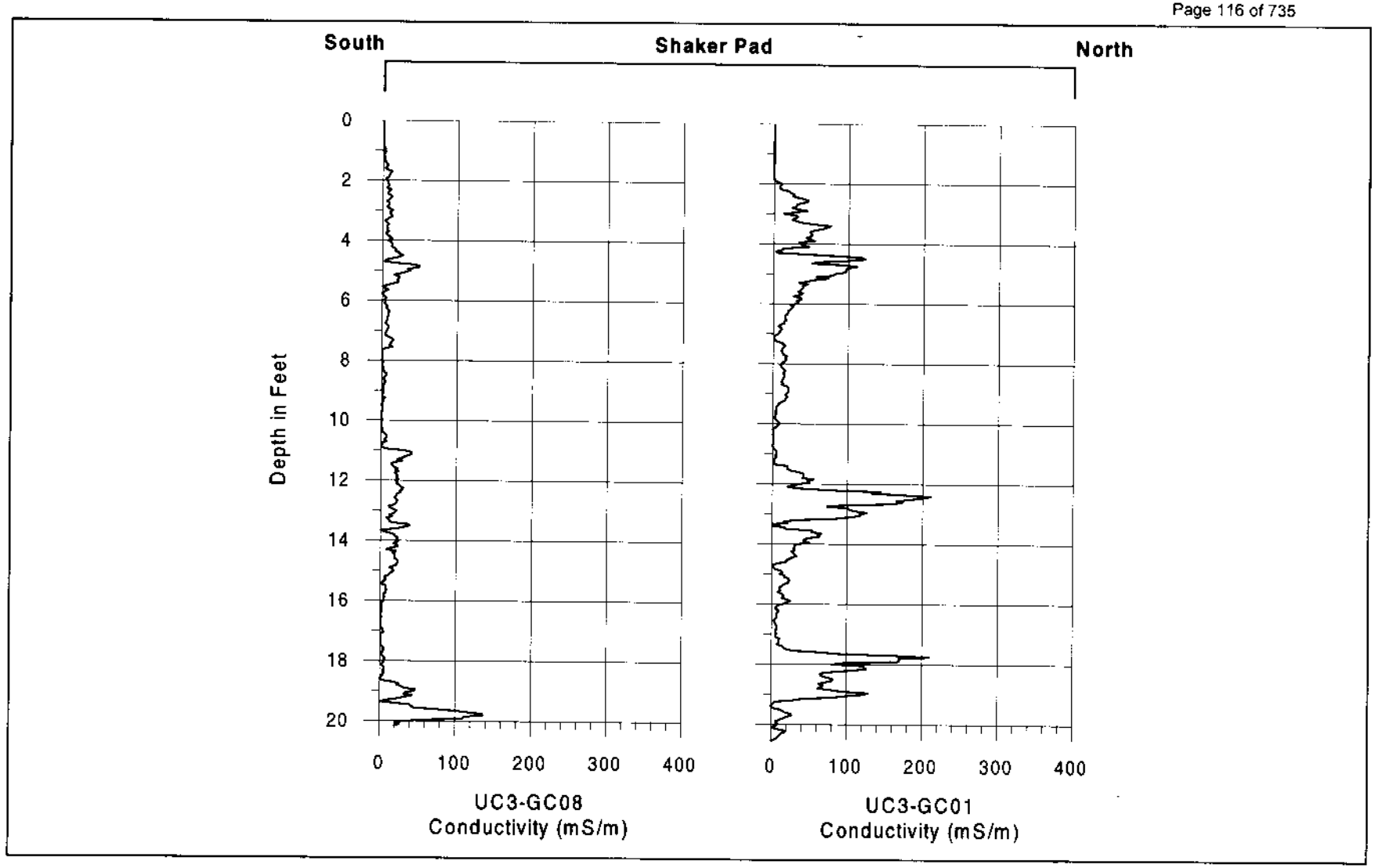


Figure D.5-9
UC-3 Shaker Pad Area North-South Cross Section
Showing Geoprobe™ Conductivity Profiles

The UC-3 Shaker Debris Area is located approximately 48 m (157 ft) northeast of the UC-3 well. Five borings were advanced within the site of the UC-3 Shaker Area. Borings were advanced to depths of between 2.44 and 3.66 m (8 and 12 ft) below the ground surface. This site contains TPH diesel/motor oil concentrations in excess of the PAL at a single boring (U3S4) with TPH at 1,670 mg/kg within the interval 1.22 - 1.83 m (4 - 6 ft). The total thickness of contaminated material within the UC-3 Shaker Debris Area is 0.61 m (2 ft) at the 1.22 - 1.83 m (4 - 6 ft) interval. No TPH above the PAL was found in any of the remaining four borings from 0 - 3.05 m (0 - 10 ft).

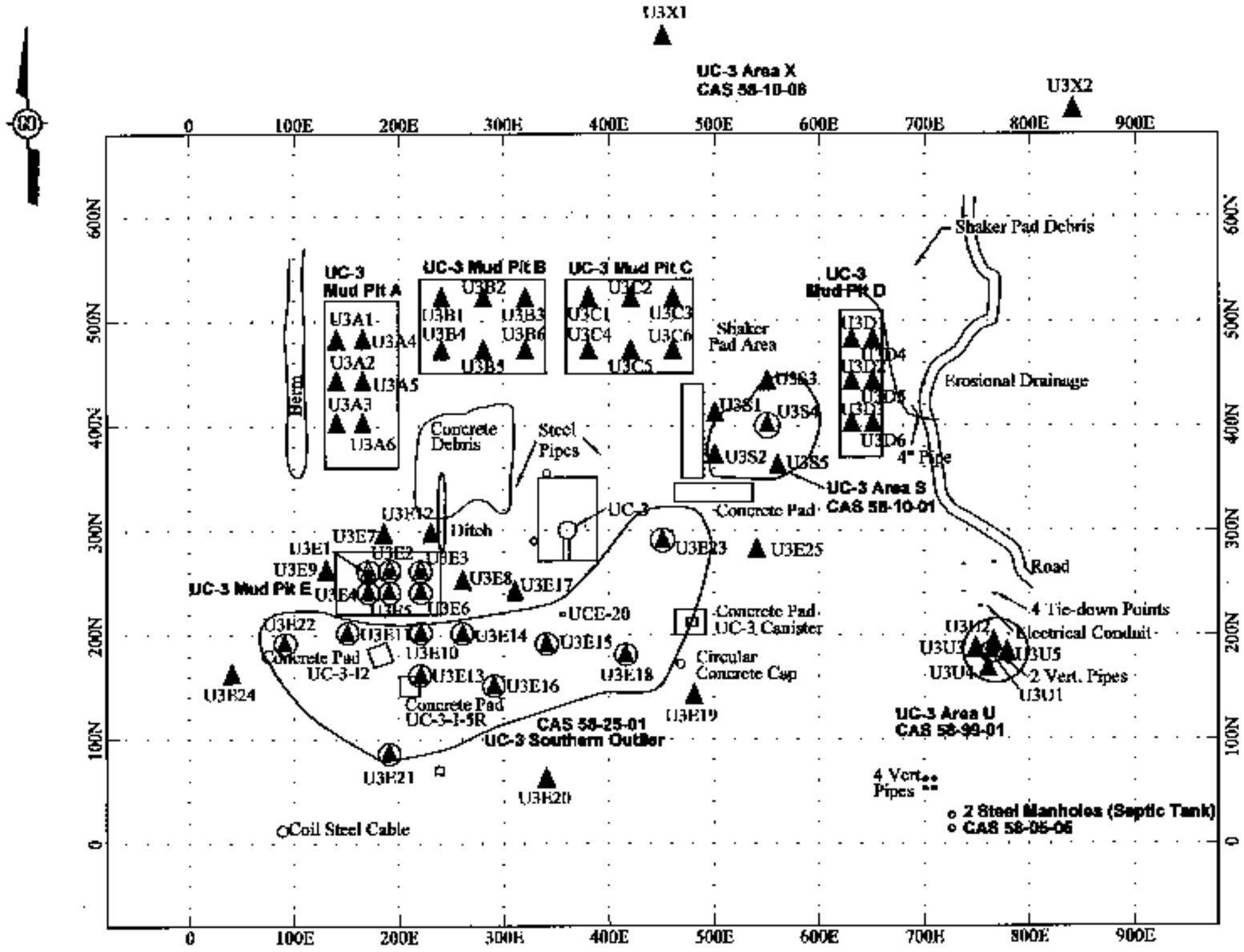
A map illustrating the locations of the soil borings is provided as Figure D.5-10. Statistical summaries based on 0.61-m (2-ft) layers are provided in Table D.5-1. A summary of analytical results for the UC-3 Shaker Debris Area is provided in Attachment F. Figure D.5-11 displays TPH data with respect to depth at all of the shaker pad area sampling locations.

Soil descriptions prepared by site geologists indicate that the TPH-contaminated interval between 1.22 - 1.83 m (4 - 6 ft) within boring U3S4 occurs within a horizon of mixed drill cuttings and native soils composed of sand and silt. Similar materials were described in borings advanced and sampled near boring U3S4, except for boring U3S5, yet the combined TPH concentrations in these borings were below the PAL.

Soil boring logs and cross-sectional views of the completed borings within the UC-3 Shaker Area are shown in Attachment J.

The uncontaminated materials in the 0 - 1.22 m (0 - 4 ft) interval overlying the contaminated horizon are comprised of mixed drill cuttings with sand and silts. Uncontaminated materials identified in the 1.83 - 3.66 m (6 - 12 ft) interval consist of native soil composed of sands and silts with minor amounts of clay and gravel.

The volume of TPH-contaminated material within the UC-3 Shaker Area is defined by a single borehole (U3S4). Given that all surrounding borings define a roughly square area measuring 15.24 m (50 ft) on each side, and that contamination was reported over a 0.61-m (2-ft) interval, the total volume of TPH-contaminated material within the UC-3 Shaker Area is calculated to be 142 m^3 (185 yd^3).



EXPLANATION

- Mud Pit
- ▲ Soil Boring Locations
- Soil Boring Locations with Chemical Samples Exceeding 100 mg/kg TPH
- Waste/Mud Pit Characterization Sample Location

NOTE
UC-4 Mud Pits A, B, C, D, and E are all CAS 58-09-06

SCALE
0 100 200 Feet
0 40 80 Meters

Figure D.5-10
UC-3 Area Location Map
Showing Locations of Soil Borings

Table D.5-1
Statistical Analysis for Mud Pit Sampling Central Nevada Test Area - UC-3 Area
(Page 1 of 3)

Area of Investigation	Sampling Interval/Layer	Analyte						Boring Number							Statistically Derived Required No. of Samples	ConceNSration Above (+) or Below (-) Action Levels	Layer Determination
			u3a1	u3a2	u3a3	u3a4	u3a5	u3a6							(Nd)	(<>+U-AL)	
UC-3 Mud Pit A	0-2'	TPH	13.7	21.2	13.6	14.2	13.6	16.6							1	-83	non-cont.
"	2-4'	TPH	22.2	21.3	24.8	17.9	15.1	25.3							1	-77	non-cont.
"	4-6'	TPH	16	24.5	14.3	13.8	19	14.7							1	-80	non-cont.
"	6-8'	TPH	67.6	43.3	13.8	13.7	18.1	14.2							1	-58	non-cont.
"	8-10'	TPH	33.2	15.9	16	17	25	13.8							1	-75	non-cont.
"	0-2'	Cr+6	50	50	50	50	50	50							0	-340	non-cont.
"	2-4'	Cr+6	50	50	50	50	50	50							0	-340	non-cont.
"	4-6'	Cr+6	50	50	50	64	50	60.6							1	-332	non-cont.
"	6-8'	Cr+6	140	50	50	50	50	50							1	-303	non-cont.
"	8-10'	Cr+6	50	50	50	58.7	50	50							1	-336	non-cont.
			u3b1	u3b2	u3b3	u3b4	u3b5	u3b6									
UC-3 Mud Pit B	0-2'	TPH	23.7	13.9	24.4	13.7	20.2	26.9							1	-76	non-cont.
"	2-4'	TPH	18.8	13.8	13.7	20	19.8	19.8							1	-81	non-cont.
"	4-6'	TPH	16.1	16	13.7	17.8	14.8	15.6							1	-84	non-cont.
"	6-8'	TPH	32	25.3	13.2	15	16.1	14.2							1	-76	non-cont.
"	8-10'	TPH	38.8	19.3	13.4	14.8	15.3	15							1	-75	non-cont.
"	0-2'	Cr+6	50	64	64	50	50	52.4							1	-331	non-cont.
"	2-4'	Cr+6	50	50	50	50	50	50							0	-340	non-cont.
"	4-6'	Cr+6	50	50	50	64	50	50							1	-334	non-cont.
"	6-8'	Cr+6	50	70.4	50	50	50	50							1	-332	non-cont.
"	8-10'	Cr+6	160	50	50	50	50	50							1	-295	non-cont.
			u3c1	u3c2	u3c3	u3c4	u3c5	u3c6									
UC-3 Mud Pit C	0-2'	TPH	13.6	21.1	13.6	27.5	29.2	13.6							1	-76	non-cont.
"	2-4'	TPH	17.9	13.6	13.6	13.4	16.5	13.8							1	-84	non-cont.
"	4-6'	TPH	14.2	14.3	13.8	17.4	13.9	11.9							1	-85	non-cont.
"	6-8'	TPH	17.2	16.2	13.1	17.7	16.4	11.7							1	-83	non-cont.
"	8-10'	TPH	16.5	24.4	15.8	14.9	13.4	14.1							1	-81	non-cont.
"	0-2'	Cr+6	50	50	50	50	50	50							0	-340	non-cont.
"	2-4'	Cr+6	50	50	50	50	50	50							0	-340	non-cont.
"	4-6'	Cr+6	50	50	50	50	50	50							0	-340	non-cont.
"	6-8'	Cr+6	50	50	64	50	50	50							1	-334	non-cont.
"	8-10'	Cr+6	50	50	50	50	50	50							0	-340	non-cont.
	8-12'	Cr+6	50	50	50										0	-340	non-cont.
			u3d1	u3d2	u3d3	u3d4	u3d5	u3d6									
UC-3 Mud Pit D	0-2'	TPH	13.6	14.3	13.6	13.4	13.6	14.4							1	-86	non-cont.
"	2-4'	TPH	14.1	13.5	14.5	14.3	16	14.1							1	-85	non-cont.
"	4-6'	TPH	51.2	14.6	16.4	17.9	17	17							1	-69	non-cont.
"	6-8'	TPH	12.8	16.2	14.8	16	12.3	15.2							1	-84	non-cont.
"	8-10'	TPH	12.6	12.4	14.8	15.3	17.8	13.3							1	-84	non-cont.
"	0-2'	Cr+6	50	50	50	50	50	50							0	-340	non-cont.
"	2-4'	Cr+6	50	50	50	50	50	50							0	-340	non-cont.
"	4-6'	Cr+6	50	50	50	50	50	50							0	-340	non-cont.
"	6-8'	Cr+6	50	50	50	50	50	50							0	-340	non-cont.
"	8-10'	Cr+6	50	50	64	50	50	50							1	-334	non-cont.
			u3e1	u3e2	u3e3	u3e4	u3e5	u3e6									
UC-3 Mud Pit E	0-2'	TPH	98.5	304.5	556	46.6	61.6	109.8							29	216	contaminated
"	2-4'	TPH	48.4	610	231	58	28.4	57.2							65	209	contaminated
"	4-6'	TPH	571	3850	178.5	56.7	99.4	1877							15	1915	contaminated
"	6-8'	TPH	15440	9910	1876	362	14.7	120.1							14	8445	contaminated
"	8-10'	TPH	1645	590	595	14.8	12.9	16.2							19	763	contaminated
"	10-12'	TPH	16.7	13.7	15.4	12.9	13.6	16.9							1	-84	non-cont.
"	12-14'	TPH	NS	NS	NS	NS	NS	NS							NA	NA	NA
"	14-16'	TPH	NS	NS	NS	NS	NS	NS							NA	NA	NA
"	16-18'	TPH	NS	NS	NS	NS	NS	NS							NA	NA	NA
"	0-2'	Cr+6	64	50	50	50	50	50							1	-334	non-cont.
"	2-4'	Cr+6	50	50	50	50	50	50							0	-340	non-cont.
"	4-6'	Cr+6	51.1	14.6	50	50	59.4	250							1	-559	non-cont.
"	6-8'	Cr+6	17.6	21.8	26.4	50	50	172							1	-214	non-cont.
"	8-10'	Cr+6	17	286	206	54.3	50	50							1	-214	non-cont.
"	10-12'	Cr+6	66.8	50	50	50	50	50							1	-333	non-cont.
"	12-14'	Cr+6	NS	NS	NS	NS	NS	NS							NA	NA	NA
"	14-16'	Cr+6	NS	NS	NS	NS	NS	NS							NA	NA	NA
"	16-18'	Cr+6	NS	NS	NS	NS	NS	NS							NA	NA	NA

Table D.5-1
Statistical Analysis for Mud Pit Sampling Central Nevada Test Area - UC-3 Area
(Page 2 of 3)

			u3e7	u3e8	u3e9	u3e10	u3e11	u3e12	u3e13	u3e14	u3e15	u3e16	u3e17	u3e18			
UC-3 Mud Pit E (S Outlier)	0-2'	TPH	23.3	17.1	13.3	1074	135.6	14.4	268.7	H	45.5	848	35.5	201.1	See below	See below	See below
"	2-4'	TPH	23.5	14.4	14.1	422	13.6	13.6	13.5	H	732	54.5	13.6	196	See below	See below	See below
"	4-6'	TPH	20.3	39.2	13.1	1209.0	13.7	15.3	13.7	H	105	16.9	14.1	NS	See below	See below	See below
"	6-8'	TPH	32.6	30.2	14.9	17010	13.7	13.6	17.6	H	1154	14.2	13.8	NS	See below	See below	See below
"	8-10'	TPH	75.3	13.6	13.4	1055	15.3	13.6	13.6	H	65.6	264	13.3	13.3	See below	See below	See below
"	10-12'	TPH	24.7	15.5	NS	2504	NS	13.6	23.7	162	30.3	R	13.4	NS	See below	See below	See below
"	12-14'	TPH				7930E				37.2					See below	See below	See below
"	14-16'	TPH				5970				21.7					See below	See below	See below
"	16-18'	TPH				854E				NS					See below	See below	See below
"	0-2'	Cr+6	50	50	50	64	50	50	50	H	50	64	50	50	See below	See below	See below
"	2-4'	Cr+6	50	50	50	50	50	50	50	H	50	50	50	50	See below	See below	See below
"	4-6'	Cr+6	50	50	50	50	50	50	50	H	50	50	50	NS	See below	See below	See below
"	6-8'	Cr+6	50	50	50	50	50	50	50	H	50	50	50	NS	See below	See below	See below
"	8-10'	Cr+6	50	64	50	50	50	50	50	H	50	50	50	50	See below	See below	See below
"	10-12'	Cr+6	50	50	50	50		50	50	50	50	R	64		See below	See below	See below
"	12-14'	Cr+6				50				50					See below	See below	See below
"	14-16'	Cr+6				50				50					See below	See below	See below
"	16-18'	Cr+6				50									See below	See below	See below

			u3e19	u3e20	u3e21	u3e22	u3e23	u3e24	u3e25		u3e26	u3e27	u3e28				
UC-3 Mud Pit E (S Outlier)	0-2'	TPH	33.1	42.3	126	111	195.7	13.7	22.3		110	15	56		17	404	Contaminated
"	2-4'	TPH	13.3	21.2	13.3	13.4	16.4	13.7	14.1		390	17	25		104	182	Contaminated
"	4-6'	TPH	23.1	21.2	13.4	13.7	13.9	13.6	14.6		2600	26	26		206	285	Contaminated
"	6-8'	TPH	14.2	13.8	90.1	NS	13.8	NS	NS		2200	27	26		43	6009	Contaminated
"	8-10'	TPH	13.3	13.1	13.7		13.7				3500	26	26		130	263	Contaminated
"	10-12'	TPH	NS	R	NS		NS				320	26	26		29	1577	Contaminated
"	12-14'										2800	26	26		9	7849	Contaminated
"	14-16'										750	26	26		15	5258	Contaminated
"	16-18'										300	26	26		5	1330	Contaminated
"	18-20'										68	26	26		NA	NA	non-cont.
"	20-22'										290	NS	26		NA	NA	non-cont.
	22-24'										47		26		NA	NA	non-cont.
	24-26'										18		NS		NA	NA	non-cont.
	26-28'										26				NA	NA	non-cont.
	28-30'										25				NA	NA	non-cont.
"	0-2'	Cr+6	50	50	H	64	50	50	50								
"	2-4'	Cr+6	50	50	H	64	50	50	50								
"	4-6'	Cr+6	50	50	H	50	50	50	50								
"	6-8'	Cr+6	50	50	H	NS	50	NS	NS								
"	8-10'	Cr+6	50	64	H		50										
"	10-12'	Cr+6	NS	R			NS										

			u3s1	u3s2	u3s3	u3s4	u3s5										
UC-3 Shaker Pad Area S	0-2'	TPH	15.7	17	28.5	19	24.7								1	-75	non-cont.
"	2-4'	TPH	29.8	17.4	14.1	39.4	32.4								1	-66	non-cont.
"	4-6'	TPH	16.4	16.6	19.1	1670	13.6								59	754	contaminated
"	6-8'	TPH	15.7	11.2	17.9	31.3	13.3								1	-74	non-cont.
"	8-10'	TPH	14.5	13.6	21	36.1	NS								1	-70	non-cont.
"	10-12'	TPH	H	NS	NS	H									NA	NA	NA
"	0-2'	Cr+6	50	50	50	50	50								0	-340	non-cont.
"	2-4'	Cr+6	50	50	50	50	64								0	-333	non-cont.
"	4-6'	Cr+6	50	64	50	50	50								1	-333	non-cont.
"	6-8'	Cr+6	50	50	50	50	50								0	-340	non-cont.
"	8-10'	Cr+6	50	50	66.1	62.4	NS								1	-326	non-cont.
"	10-12'	Cr+6	H	NS	NS	H									NA	NA	NA

			u3u1	u3u2	u3u3	u3u4	u3u5										
UC-3 U Area	0-2'	TPH	13.4	13.7	H	H	H								NA	NA	NA
"	2-4'	TPH	13.5	19.2	13.8	33.3	25.5								NA	NA	NA
"	4-6'	TPH	595.2	13.3	13.4	13.3	13.8								NA	NA	NA
"	6-8'	TPH	3209	R	13.7	13.6	17.5								NA	NA	NA
"	8-10'	TPH	21.8		H	H	H								NA	NA	NA
"	10-12'	TPH	R		H	H	H								NA	NA	NA
"	0-2'	Cr+6	50	50	H	H	H								NA	NA	NA
"	2-4'	Cr+6	50	50	H	H	H								NA	NA	NA
"	4-6'	Cr+6	50	50	H	H	H								NA	NA	NA
"	6-8'	Cr+6	NS	R	H	H	H								NA	NA	NA
"	8-10'	Cr+6	NS		NS	H	H								NA	NA	NA
"	10-12'	Cr+6	R			H	H								NA	NA	NA

Table D.5-1
Statistical Analysis for Mud Pit Sampling Central Nevada Test Area - UC-3 Area
(Page 3 of 3)

			u3x1	u3x2	u3x3	u3x4	u3x5									
UC-3 Area X North	0-2'	TPH	30.9	29.4	24.3	20.8	26.9							1	-71	non-cont.
"	2-4'	TPH	40.7	18.6	12.3	14.6	19.6							1	-71	non-cont.
"	4-6'	TPH	17.8	12.7	12.4	16	14							1	-84	non-cont.
"	6-8'	TPH	15.1	15	15.8	R	13.8							1	-85	non-cont.
"	8-10'	TPH	H	13.7	H		NS							NA	NA	NA
"	10-12'	TPH	R	H	H									NA	NA	NA
"	0-2'	Cr+6	102	123	103	62.1	105							1	-286	non-cont.
"	2-4'	Cr+6	115	50	50	50	50							1	-317	non-cont.
"	4-6'	Cr+6	50	50	64	50	50							1	-343	non-cont.
"	6-8'	Cr+6	50	50	50	R	50							0	-350	non-cont.
"	8-10'	Cr+6	H	50	H		NS							NA	NA	NA
"	10-12'	Cr+6	R	H	H									NA	NA	NA
			u3y1	u3y2	u3y3	u3y4	u3y5									
UC-3 Area Y Southwest	0-2'	TPH	36.9	59.5	34.7	35.4	31.1							1	-53	non-cont.
"	2-4'	TPH	18.9	20.1	13.2	18.6	16.2							1	-81	non-cont.
"	4-6'	TPH	13.7	13.2	18	13.7	13.6							1	-84	non-cont.
"	6-8'	TPH	H	H	NS	H	13.6							NA	NA	NA
"	0-2'	Cr+6	88.8	132	88	94.3	144							1	-272	non-cont.
"	2-4'	Cr+6	50	63	50	50	50							1	-343	non-cont.
"	4-6'	Cr+6	50	50	50	50	50							0	-350	non-cont.
"	6-8'	Cr+6	H	H	NS	H	50							NA	NA	NA
			u3z1	u3z2	u3z3	u3z4	u3z5	u3z6	u3z7	u3z8	u3z9					
UC-3 Area Z Southeeast	0-2'	TPH	35.3	26.2	115.3	676	20.4	21.3	20.4	23.7	17.2			50	368	contaminated
"	2-4'	TPH	28.4	14.5	18	13.9	14.3	14	15.8	13.7	13.7			1	-76	non-cont.
"	4-6'	TPH	14.8	14.1	12.9	43.4	H	H	H	H	H			1	-67	non-cont.
"	6-8'	TPH	H	H	H	H	H	H	H	H	H			NA	NA	NA
"	0-2'	Cr+6	138	146	80.1	189	50	50	50	50	50			1	-225	non-cont.
"	2-4'	Cr+6	60.2	50	50	50	50	50	50	50	50			1	-343	non-cont.
"	4-6'	Cr+6	50	50	64	50	H	H	H	H	H			1	-341	non-cont.
"	6-8'	Cr+6	H	H	H	H	H	H	H	H	H			NA	NA	NA

NOTES:
All values are reported as milligrams/kilogram (mg/kg)
Nd = Number of samples needed to make decision
<> = Mean value of all measurements in given layer
U = Upper confidence limit
AL = Action level (100mg/kg TPH & 400 mg/kg Hex Cr)
If <>+U-AL > 0 then layer is above Action Level But if <0 then layer is below Action leve
TPH = Sum of diesel and motor oil componeNSs
NA = Not analyzed
R = No sample collected due to refusal conditions within boring
H = Sample collected and held by laboratory and not analyzed
NS = No sample taken boring not advanced to depth
TBD = To be determined, insufficient data/investigation not complete
u3xx = Boring and associated samples included in statistical calculations

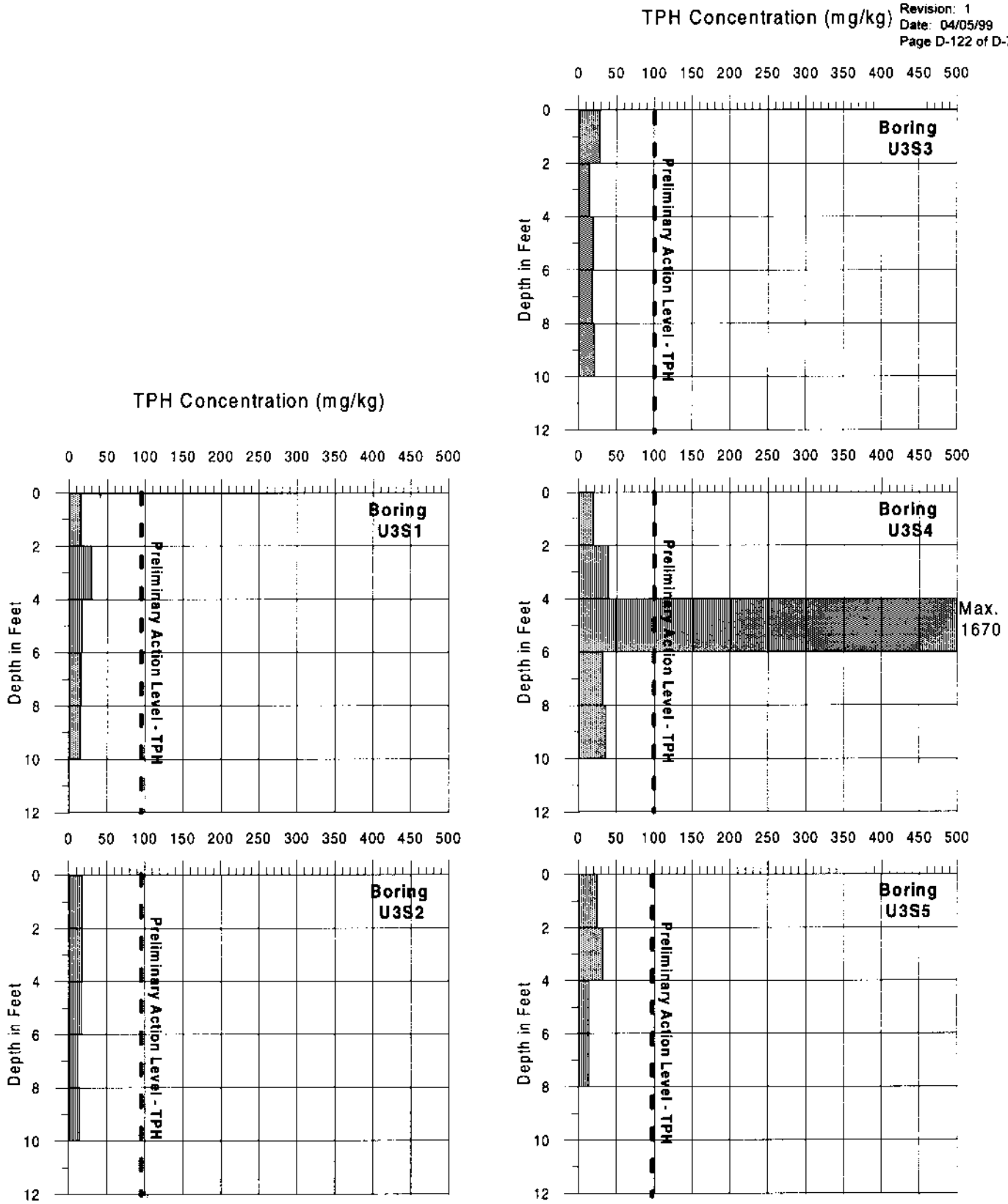


Figure D.5-11
UC-3 Area S, Shaker Pad Area
TPH Concentrations from Chemical Sampling

D.5.3.4 UC-3 Mud Pit E (CAS 58-09-06)

The estimated location of UC-3 Mud Pit E shows an in-phase (metal) EM31 anomaly (Figure D.5-6). The discontinuous nature of the in-phase (metal) anomaly is representative of buried scrap metal. The lack of a large conductivity anomaly at this location indicates that UC-3 Mud Pit E may no longer contain drilling mud and may have been partially backfilled with scrap metal.

Only one Geoprobe™ conductivity log (UC3-GC35) was located directly within the UC-3 Mud Pit E. This log indicates background conductivities to a depth of about 4.72 m (15 ft) where conductivities increase to as much as 100 mS/m down to 5.49 m (18 ft) and then again between 5.79 and 6.10 m (19 and 20 ft). These localized increases are likely due to natural clays and silts or increases in moisture content. A cross section of conductivity logs through Pit 3E is shown in Figure D.5-12.

The UC-3 Mud Pit E, located approximately 44.20 m (145 ft) southwest of the UC-3 well, was determined statistically to contain TPH diesel/motor oil concentrations in excess of the preliminary site action level. TPH diesel/motor oil contamination was found in composite soil samples obtained on 0.61-m (2-ft) intervals from borings located in UC-3 Mud Pit E. The TPH-contaminated intervals/layers occur in the sample intervals 0 - 0.61 m (0 - 2 ft), 0.61 - 1.22 m (2 - 4 ft), 1.22 - 1.83 m (4 - 6 ft), 1.83 - 2.44 m (6 - 8 ft), and 2.44 - 3.05 m (8 - 10 ft). The total thickness of TPH diesel/motor oil contaminated materials within the mud pit is 3.05 m (10 ft). All six borings at the 3.05 - 3.66 m (10 - 12 ft) intervals were well below the PAL for TPH.

Ten borings were advanced within and near UC-3 Mud Pit E. Borings were advanced and sampled to depths of 3.66 m (12 ft). Six borings were advanced within the mud pit and four borings were advanced outside the mud pit. No TPH concentrations exceeded the PAL in three of the borings (U3E7, U3E8, and U3E9) located outside the mud pit perimeter on the north, east, and west of the mud pit. Boring U3E10, located slightly south of Mud Pit E, encountered TPH diesel/motor oil concentrations in excess of the PAL over 0.61-m (2-ft) intervals extending from the ground surface to a depth of 5.49 m (18 ft). The highest reported combined TPH diesel/motor oil concentration for UC-3 Mud Pit E was 17,010 mg/kg occurring in boring U3E10 within the 1.83 - 2.44 m (6 - 8 ft) sample interval.

Five borings advanced inside UC-3 Mud Pit E were shown to contain combined TPH diesel/motor oil concentrations in excess of the PAL. A single boring (U3E5) within the mud pit did not contain TPH diesel/motor oil above the PAL, although the value at the 1.22 - 1.83 m (4 - 6 ft) interval was 99.4 mg/kg. The highest reported TPH diesel/motor oil concentration resulting from

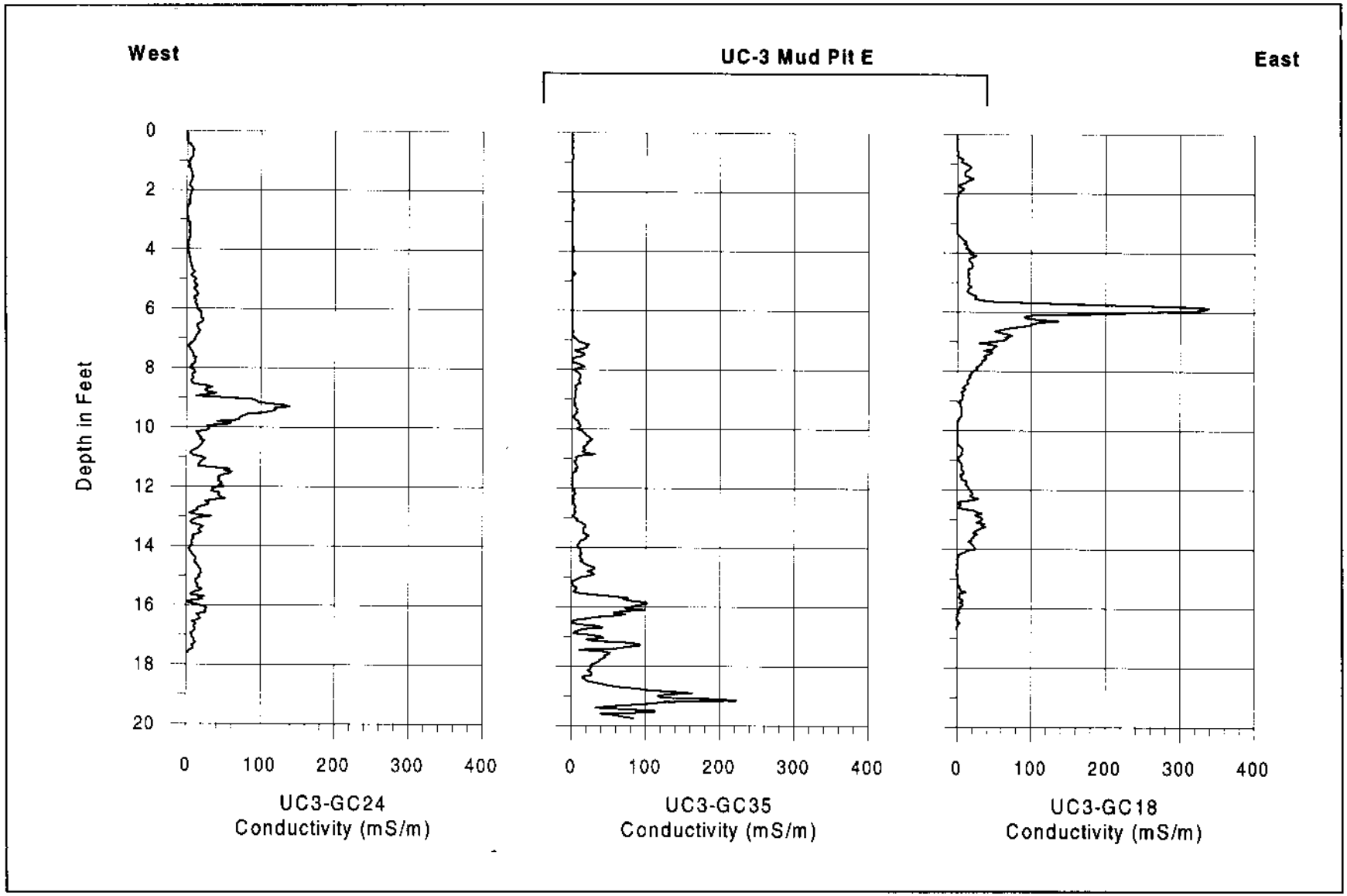


Figure D.5-12
UC-3 Mud Pit E East-West Cross Section
Showing Geoprobe™ Conductivity Profiles

sampling in the mud pit was recorded in boring U3E1 within the 1.83 - 2.44 m (6 - 8 ft) interval at 15,440 mg/kg.

A summary of the statistical analysis for analytical results from Mud Pit E samples is provided in Table D.5-1. A summary of the analytical results for soil boring samples including the associated QA/QC samples for UC-3 Mud Pit E is included in Attachment F. Figure D.5-10 provides a map of all soil borings completed in Mud Pit E and shows those borings with sample intervals in excess of the PAL for TPH diesel/motor oil. Figures D.5-13 through D.5-14 display TPH data with respect to depth at all of the Pit 3E area sampling locations.

Soil descriptions prepared by the site geologists indicate the TPH-contaminated interval between the surface and a depth of 3.05 m (10 ft) occurs within two differing types of materials. The upper portion from approximately 0 - 1.52 m (0 - 5 ft) is comprised of native soils consisting of sands with some silt. This material was used as backfill on the underlying interval between 1.52 - 3.05 m (5 - 10 ft). The interval between 1.52 - 3.05 m (5 - 10 ft) is comprised of layers of drilling muds, drill cuttings, and mixtures of drill cuttings and drilling mud. The combined thickness of both contaminated horizons is approximately 3.05 m (10 ft). Uncontaminated materials within the 3.05 - 3.66 m (10 - 12 ft) interval that underlie the aforementioned TPH-contaminated horizons are native soils consisting of dry sands and silts. Soil boring logs and cross-sectional views of these borings are provided in Attachment J.

The total volume of TPH-contaminated material contained within the UC-3 Mud Pit E occurs over a rectangular area measuring approximately 30.48 m (100 ft) in length and 18.29 m (60 ft) in width with a thickness of 3.05 m (10 ft). Based on these dimensions the total volume of TPH-contaminated material within the UC-3 Mud Pit E is calculated to be 1,700 m^3 (2,222 yd^3).

D.5.3.5 UC-3 Mud Pit E Southern Outlier (CAS 58-25-01)

The UC-3 Mud Pit E Southern Outlier is an irregular area beginning near the southern perimeter of Mud Pit E and extending nearly 45.72 m (150 ft) in a southerly direction and approximately 128.01 m (420 ft) in an easterly direction (Figure D.5-1). The UC-3 Mud Pit E Southern Outlier is an area of TPH-contaminated soils that appear related to spillage of TPH products of diesel and motor oil. The UC-3 Southern Outlier was investigated as a result of combined TPH concentrations identified in boring U3E10 located on the central southern perimeter outside the UC-3 Mud Pit (Figure D.5-15).

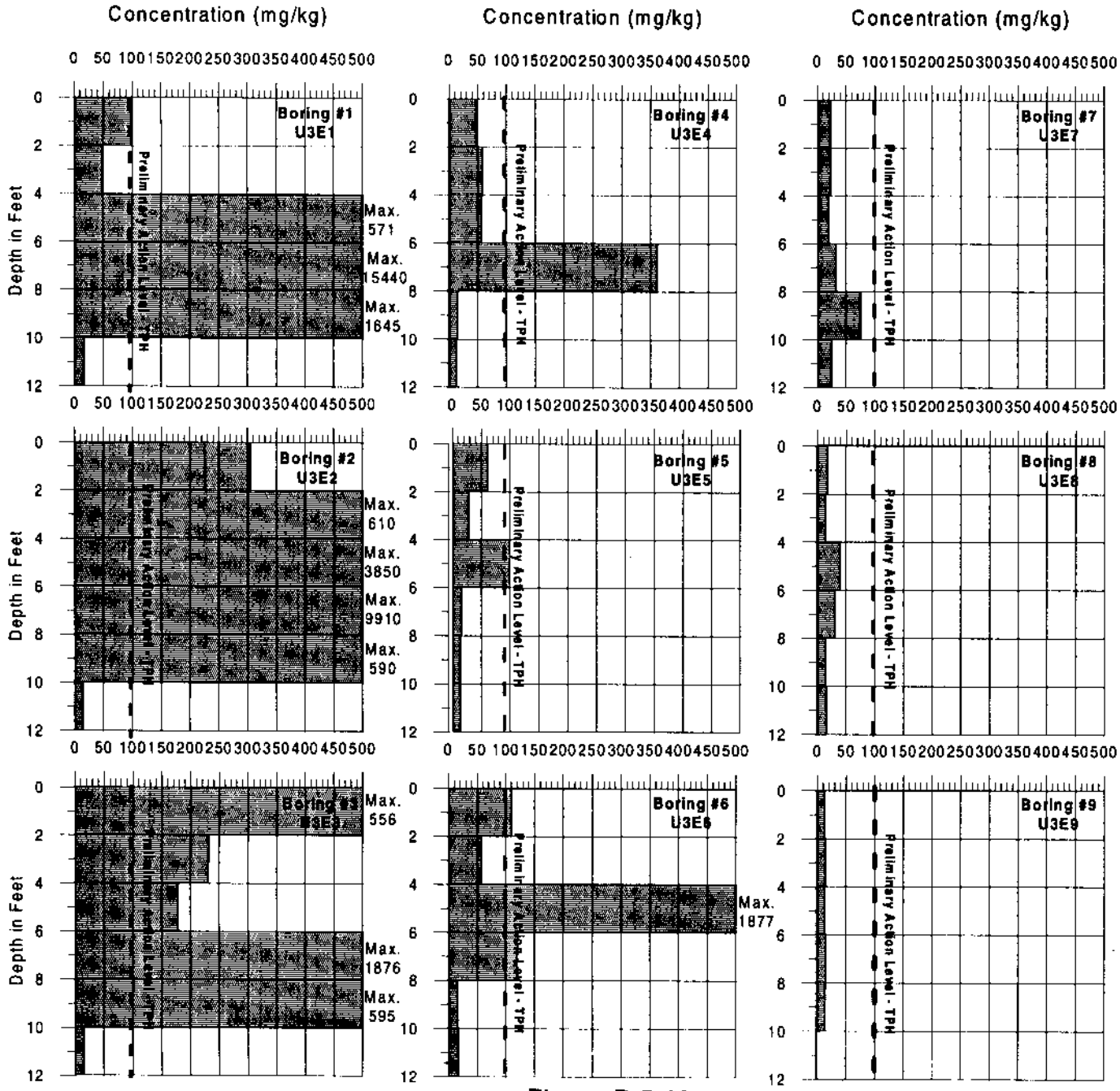


Figure D.5-13
UC-3 Mud Pit E
TPH Concentrations from Chemical Sampling

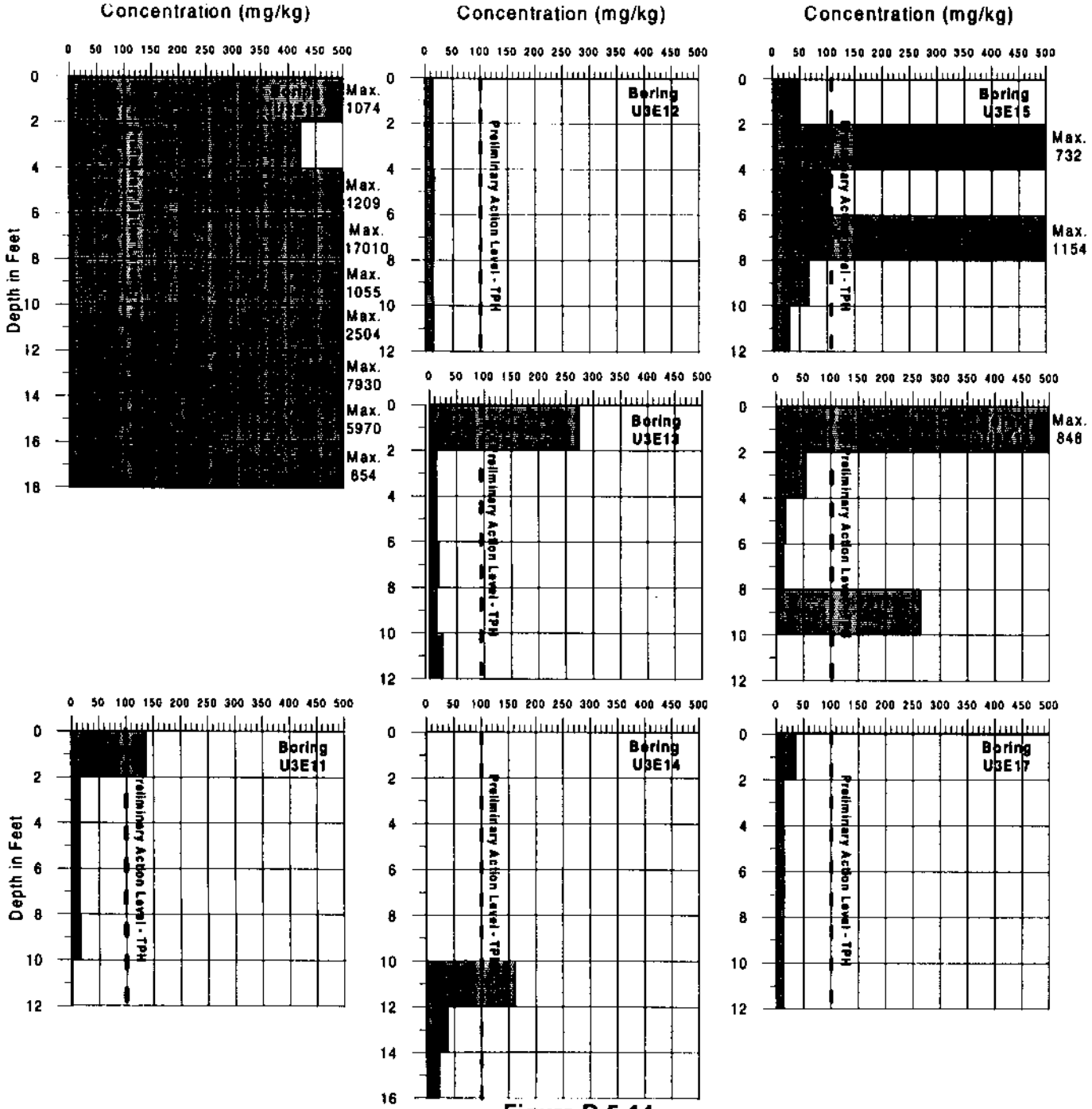


Figure D.5-14
UC-3 Mud Pit E Southern Outlier Area, TPH Concentrations from Chemical Sampling Borings U3E10 to U3E17

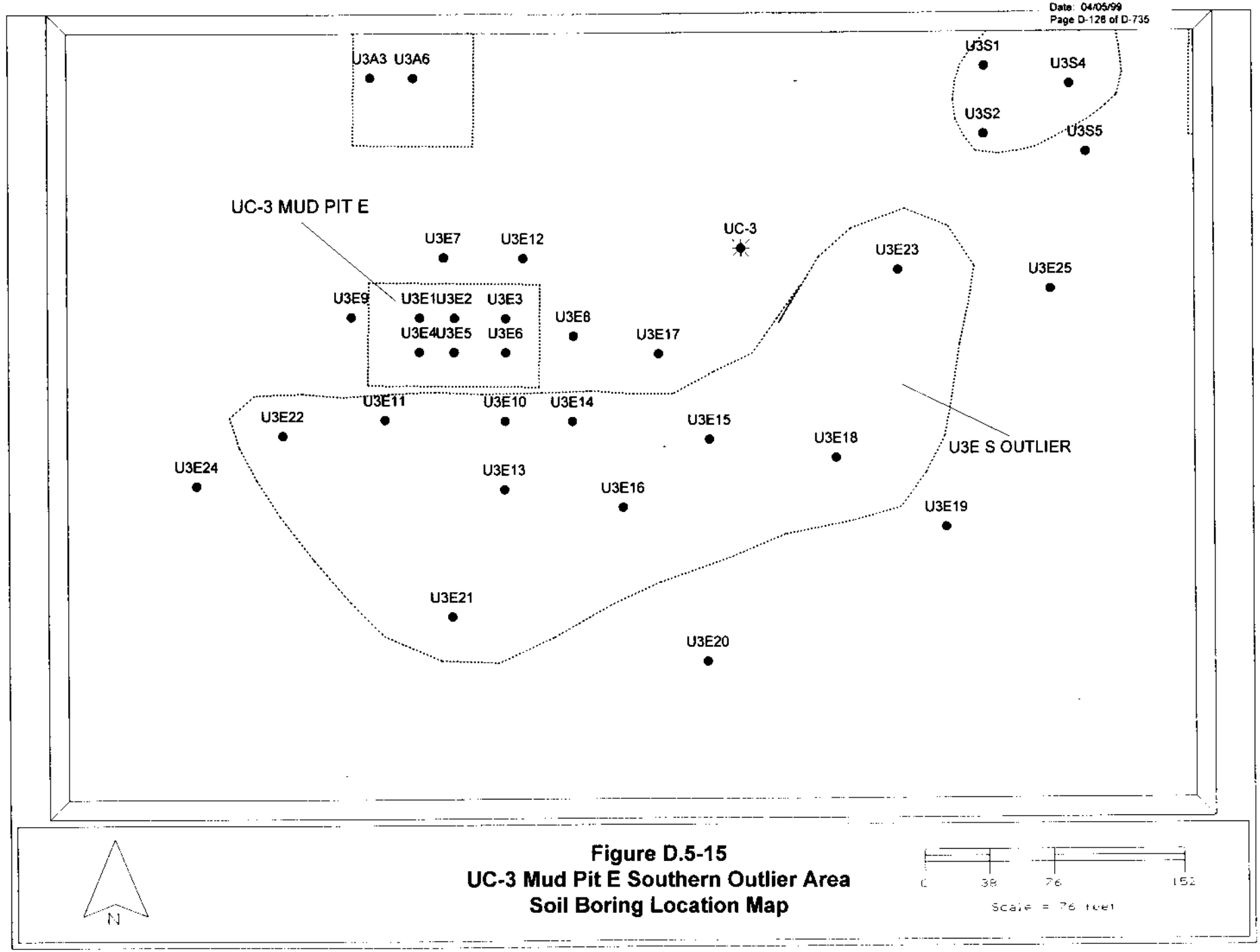


Figure D.5-15
UC-3 Mud Pit E Southern Outlier Area
Soil Boring Location Map

The UC-3 Mud Pit E Southern Outlier contains TPH diesel/motor oil in excess of the PAL of 100 mg/kg. TPH contamination was found in soil samples from soil boring U3E10 over 0.61 m (2-ft) intervals to a depth of 5.49 m (18 ft). TPH contamination persisted within samples obtained from the 0 - 3.05 m (0 - 10 ft) interval in borings located to the south and east of the U3E10 boring location (U3E15 and U3E16). Figure D.5-15 gives the soil boring locations and numbers.

The UC-3 Mud Pit E Southern Outlier investigations conducted in May and June 1997 did not completely define the vertical extent of TPH diesel/motor oil contamination within the area of borings U3E10 and U3E16. Boring U3E10 encountered refusal at a depth of 5.49 m (18 ft), with TPH concentrations of 854 mg/kg for the final sampling 4.88 - 5.49 m (16 - 18 ft) interval. Boring U3E16 encountered TPH diesel/motor concentrations of 264 mg/kg within the 2.44 - 3.05 m (8 - 10 ft) interval when the boring met refusal at a depth of 3.05 m (10 ft).

The lateral extent of contamination was reasonably well constrained from the May and June 1997 field work. Additional work was conducted in June 1998 to completely define the vertical and horizontal extent of contaminated soils. An additional boring was placed along the southern perimeter, south of boring U3E21, to complete horizontal definition, and two borings were installed within the area of borings U3E10 and U3E16 to complete defining the vertical extent of TPH diesel/motor oil contamination. This additional work is described in Section D.7.5.5.

Sixteen borings were advanced to investigate the UC-3 Mud Pit E Southern Outlier Area. Nine borings were advanced and sampled on 0.61-m (2-ft) intervals within the area of TPH-contaminated soils. The highest reported combined TPH concentration occurred in boring U3E10 within the 1.83 - 2.44-m (6 - 8-ft) interval with a TPH diesel/motor oil concentration of 17,010 mg/kg. Seven borings were advanced into areas determined to be outside the area of suspected, combined TPH contamination. No contamination in excess of the PAL was reported in samples from the seven borings (U3E12, U3E17, U3E19, U3E20, U3E21, U3E24, and U3E25) that define the approximate lateral extent of TPH contamination. Figures D.5-14 and D.5-16 display TPH data with respect to depth at all UC-3 Mud Pit E Southern Outlier locations.

A summary of statistical results for the UC-3 Mud Pit E Southern Outlier is provided in Table D.5-1. A summary of analytical data including associated QA/QC samples for the UC-3 Mud Pit E Southern Outlier is provided as Attachment F.

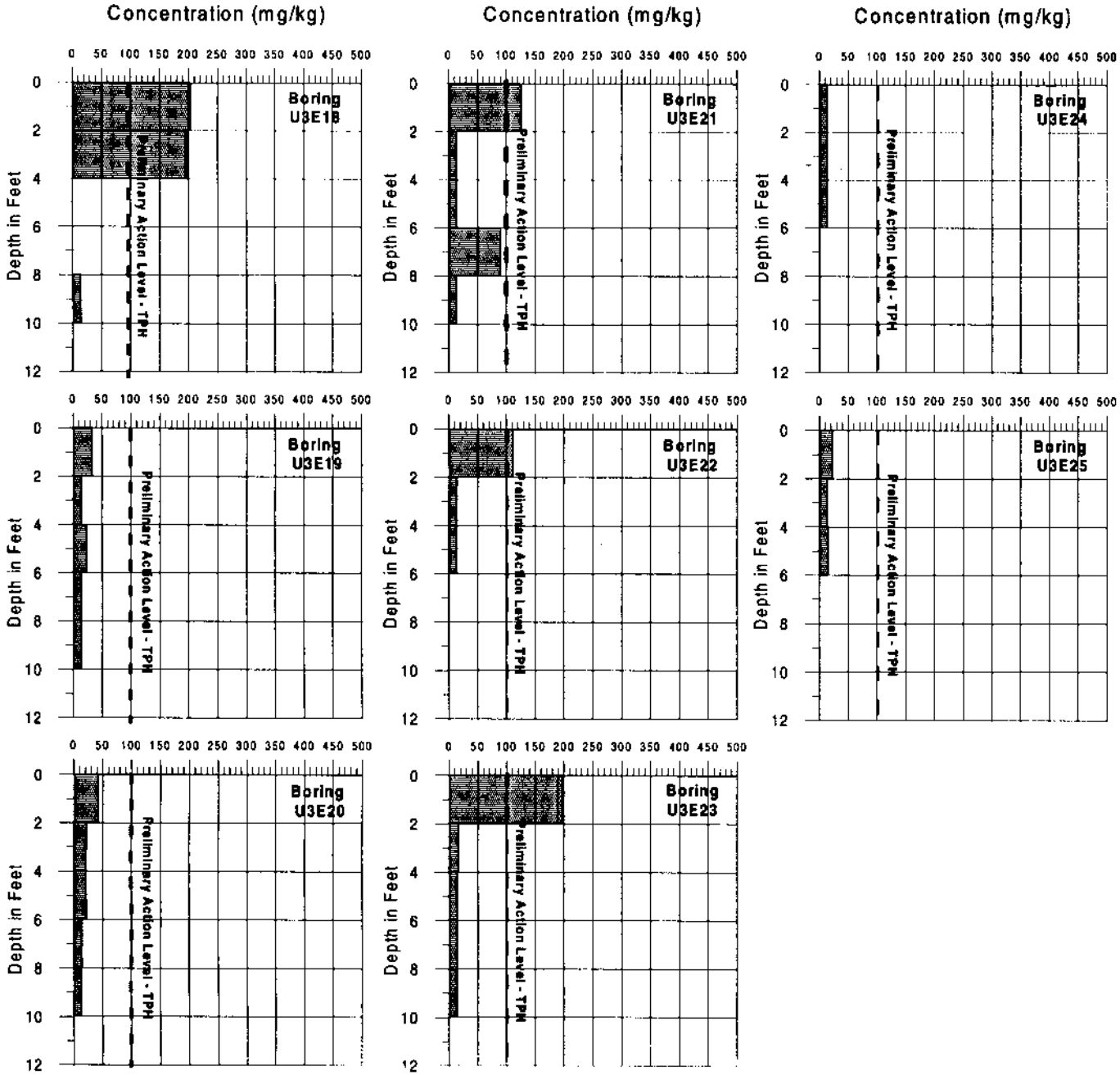


Figure D.5-16
UC-3 Mud Pit E Southern Outlier Area
TPH Concentrations from Chemical Sampling
Borings U3E18 to U3E23

Soil descriptions prepared by site geologists indicate the TPH-contamination occurs within native soil horizons consisting of sands with some silt and sand/silt mixtures and some gravel. Soil boring logs and cross-sectional views of borings from UC-3 Mud Pit E Southern Outlier borings are included in Attachment J. Uncontaminated soils both overlying and underlying contamination are similar in composition.

The volume of TPH-contaminated material contained within the UC-3 Mud Pit E Southern Outlier occurs over an irregular-shaped area elongated in an east to west direction. The contaminated soils cover an area approximately 128.01 m (420 ft) in length with a width of 36.58 m (120 ft) and occur within the top 0.61 m (2 ft). Contamination at depth is variable, but is estimated to extend to a nominal depth of 5.49 m (18 ft) for the purposes of calculation. Based on these dimensions the total volume of contaminated soils within this area is calculated to be 25,709 m^3 (33,600 yd^3).

D.5.3.6 Southeastern Shaker Debris Area (Area Z) (CAS 58-44-03)

The Southeastern Shaker Debris Area (Area Z) is an irregular area approximately 396 m (1,300 ft) south-southeast of the UC-3 well location (see Figure D.5-1). Shaker debris is elongated in a northerly direction with a length of approximately 131.06 m (430 ft) and an approximate width of 45.72 m (150 ft). The UC-3 Southeast Shaker Debris Area is an area statistically determined to contain TPH diesel/motor oil in excess of the PAL of 100 mg/kg. The TPH contamination was indicated within the depth interval of 0 - 0.61 m (0 - 2 ft) below the ground surface.

Nine borings were advanced to investigate TPH contamination within the UC-3 Southeastern Shaker Debris area. Borings were advanced to depths of between 1.22 - 2.44 m (4 - 8 ft). Four borings were advanced within visible shaker debris to depths of 2.44 m (8 ft). Five borings were advanced outside areas of visible shaker debris. Two of the borings, located within the shaker debris material (U3Z3 and U3Z4) encountered combined TPH diesel/motor oil concentrations of 115.3 mg/kg and 676 mg/kg, respectively, within the depth interval 0 - 0.61 m (0 - 2 ft). No TPH concentrations exceeding preliminary site action limits were encountered in any of the other borings within or outside the visible shaker materials. Figure D.5-17 displays TPH data with respect to depth at all of the Area Z sampling locations.

A summary of the statistical results for this area is provided in Table D.5-1. Attachment F provides a summary of the analytical results for the samples collected for the UC-3 Shaker Debris Area.

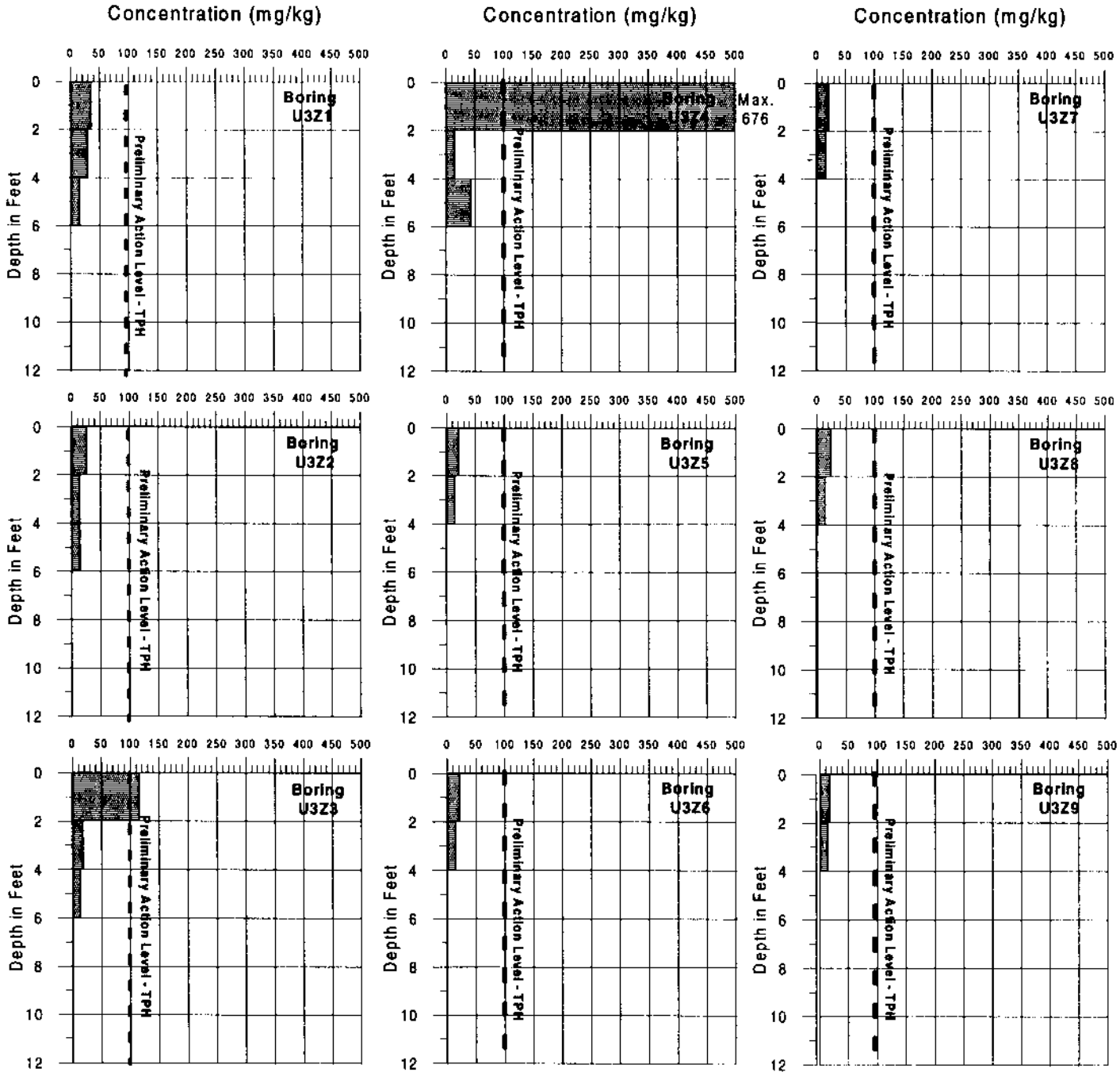


Figure D.5-17
UC-3 Area Z
TPH Concentrations from Chemical Sampling

Soil descriptions prepared by site geologists indicate that the contaminated intervals encountered in borings from ground surface to a depth of 0.61 m (2 ft) occur within horizons of moist drilling mud and drill cuttings. Uncontaminated materials outside and underlying contaminated intervals are comprised of native soil horizons consisting of sandy silts with some gravel. Soil boring logs and cross-sectional views of the borings within the area are provided within Attachment J.

The volume of TPH-contaminated material identified within the UC-3 Southeastern Debris Area (Area Z) occurs over an area measuring approximately 87.78 m (288 ft) in length and 14.63 m (48 ft) in width with a thickness of 0.61 m (2 ft). Based on these dimensions the volume of TPH-contaminated material present with the UC-3 Southeastern Debris Area (Area Z) is calculated to be approximately 783 m^3 (1,024 yd^3).

D.5.3.7 UC-3 Potential UST (Area U) (CAS 58-99-01)

Two protruding pipes, possibly related to an underground storage tank (UST) and matching the description in the CAIP (CAS 58-99-01), were found southeast of the UC-3 emplacement well. The pipes are just outside the gridded area near the edge of a 0.91 to 1.22 m (3 to 4 ft) embankment. An extension to the grid was added to cover this area.

The EM31 in-phase metal data (Figure D.5-8) indicate the presence of the pipes, but the EM data do not indicate a tank at the location of the pipes. A large in-phase (metal) response is observed north of the pipes, near the four metal tie-downs (see Figure D.5-2).

A magnetometer was used to carry out a reconnaissance survey over the area around the pipes. The magnetometer response shows the pipes, but not the presence of a large tank. However, the magnetometer does indicate buried ferrous metal to the north of the two protruding pipes in an area with four metal tie-downs. This is consistent with the large EM31 in-phase (metal) response to the north of the pipes, possibly indicating the presence of a tank or other buried ferrous metal.

In close proximity to the vertical pipes are two steel manholes in the southeast corner of the site. These manholes provide access to a large concrete septic tank. In addition, four vertical pipes were identified. A conductivity anomaly centered at 730E, 70N is just north of the four vertical pipes and two steel manholes.

Four Geoprobe™ conductivity logs (UC3-GC14, UC3-GC15, UC3-GC16 and UC3-GC29) were obtained within this anomalous area. Some thin layers with elevated conductivities are seen in all four of the conductivity logs. The most significant elevated conductivities are seen at the bottom of all four conductivity logs. In conductivity logs UC3-GC29 and UC3-GC16, conductivities average

about 100 mS/m between 4.88 and 5.79 m (16 and 19 ft). Further south, in conductivity logs UC3-GC15 and UC3-GC14, the elevated conductivities are between 5.64 and 6.10 m (18.5 and 20 ft) deep. These localized increases are likely due to natural clays and silts, increases in moisture content, or residues from the septic leach field. A cross section of these conductivity logs is shown in Figure D.5-18.

The UC-3 Area U is located approximately 125 m (410 ft) east of the UC-3 well site (Figure D.5-1). The site is the location of a possible buried underground storage tank which was identified in previous site visits as a result of two protruding pipes visible on the ground surface.

Five borings were advanced within the site of the UC-3 Area U and sampled to depths of between 1.83 and 8.66 m (6 and 12 ft) below ground surface. TPH diesel/motor oil contamination was reported within the U3U1 boring between 1.22 - 1.83 m (4 - 6 ft) and 1.83 - 2.44 m (6 - 8 ft) with combined TPH concentrations of 595 mg/kg and 3,209 mg/kg, respectively. The total thickness of soils affected by TPH within this site is 1.22 m (4 ft). No indication of an underground storage tank was apparent from the borings completed in this area.

Four borings were advanced surrounding boring U3U1 that did not encounter TPH contamination in excess of the PAL of 100 mg/kg. A summary of the analytical results for UC-3 Area U is provided in Table D.5-1. Soil boring logs for the UC-3 Area U are provided in Attachment J. Figure D.5-19 displays TPH data with respect to depth at all of the Area U sampling locations.

Soil descriptions prepared by site geologists indicate the TPH diesel/motor oil contamination reported in boring U3U1 in the 1.22 - 2.44 m (4 - 8 ft) interval occurs within native soils composed of sands with some silt and minor gravel. All other borings encountered soils of a similar composition yet contained no TPH diesel/motor oil in excess of the PAL. Soil boring logs and cross sectional views for the completed soil borings are shown in Attachment J.

A summary of the statistical analysis for sample analysis results is provided in Table D.5-1. A summary of the analytical results for samples from UC-3 Area U including QA/QC samples are included in Attachment F.

The total volume of TPH-contaminated material contained within the potential underground storage tank area (Area U) is estimated based on a single boring (U3U1), and, therefore, is uncertain. The contamination is assumed to be contained within an area measuring approximately

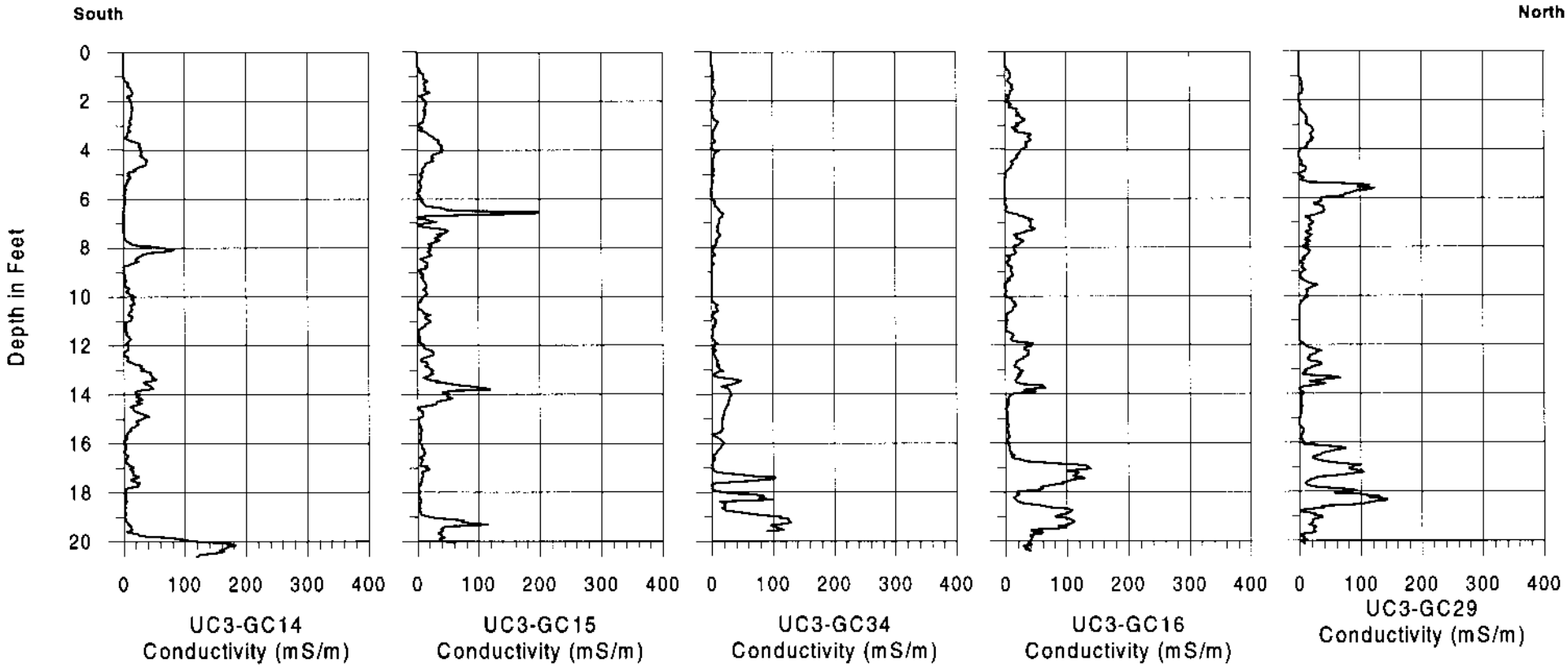


Figure D.5-18
UC-3 Eastern Area North-South Cross Section
Showing Geoprobe™ Conductivity Profiles

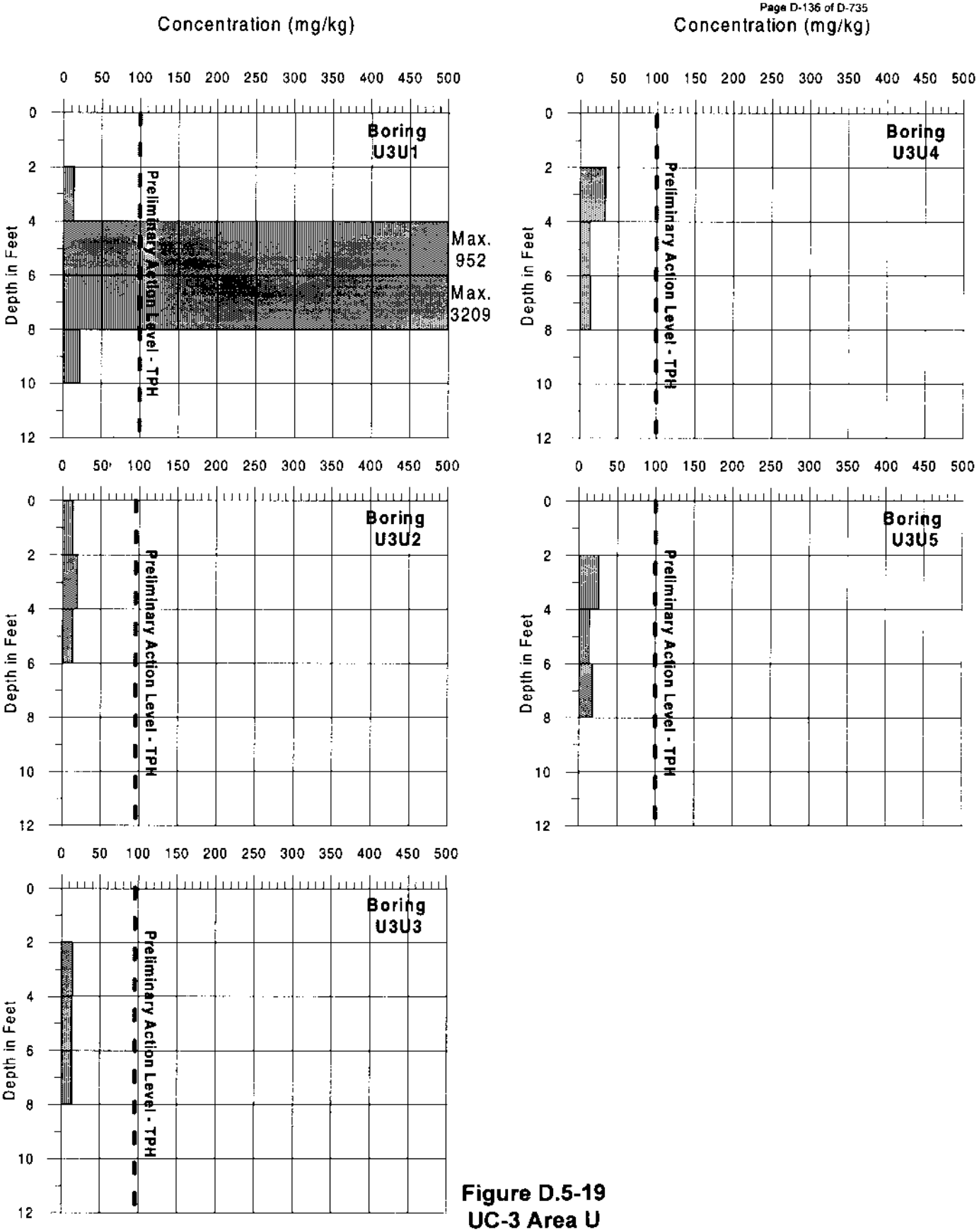


Figure D.5-19
UC-3 Area U
TPH Concentrations from Chemical Sampling

3.05 m (10 ft) on each side and has a thickness of 1.22 m (4 ft). Based on these dimensions the total volume of TPH-contaminated soils is calculated to be 11 m^3 (15 yd^3).

Additional work was completed on this site during the June 1998 field activity. This is described in Section D.7.5.7 of this report.

D.5.3.8 UC-3 Well Area Uncontaminated Sites of Investigation

Three of the seven CASs investigated for potential contaminants of concern were statistically determined from soil sample results to not contain COC concentrations in excess of the PAL. These sites are listed as follows:

- UC-3 Mud Pits A, B, C, D (CAS 58-09-06)
- UC-3 Northern Shaker Debris Area X (CAS 58-10-06)
- UC-3 Southern Shaker Debris Area Y (CAS 58-44-04)

Mud Pits 3A to 3D were sampled at six locations each from 0 - 3.05 m (0 to 10 ft), and all samples and layers had TPH values well below the PAL. Shaker debris areas X and Y were sampled at five borings each to depths of 1.83 or 2.44 m (6 or 8 ft). All samples and layers had TPH values well below the PAL.

Information regarding the location of these sites is located in Attachment I. Figure D.5-1 provides a map depicting the location of the areas of investigations. A summary of statistical evaluations of sample results is provided in Table D.5-1. Analytical results for samples from these areas including QA/QC samples are included in Attachment F. Soil boring location maps, soil boring logs, and cross-sectional views of the borings are provided in Attachment J.

D.6.0 Waste Management

Investigation Derived Waste generated during the CNTA Phase 1 and Phase 2 activities was managed according to regulatory requirements, field observations, and the results of DOE-approved, laboratory analysis of site characterization samples. Only three waste types were generated: 1) hazardous waste generated by the on-site mobile laboratory; 2) hydrocarbon waste; and 3) sanitary waste generated through soil sampling activities. These wastes were stored in 90-day hazardous waste accumulation areas established at each investigation site (UC-1/CMP, UC-2, and UC-3).

All soil samples collected from UC-1, UC-3, and UC-4 were scanned with an Electra and gamma detector for radiation above background levels. Though these instruments did not detect levels above background, the waste characterization samples from these sites were analyzed for radiological constituents. Due to the history of the UC-1 area, all waste generated during the field investigation of this area was handled and carefully documented as if it were low-level waste. Waste generated from this site was treated strictly as hazardous, hydrocarbon, or sanitary only after analytical results were returned from an off-site laboratory with data documenting that no radiochemicals were present in the samples.

D.6.1 Phase 1 Waste Management

Phase 1 site characterization activities at CNTA generated a small volume of investigation-derived waste. This waste was characterized through association with soil samples that were taken in the CMP and surrounding areas. Because the toxicity characteristic leaching procedure results for chromium for those samples exceeded the RCRA maximum concentration of contaminants all personal protective gear and decontamination rinsate associated with the Phase 1 effort were declared hazardous waste. This waste was transported off site to a permitted Treatment, Storage, and Disposal (TSD) facility prior to commencement of Phase 2 site characterization operations.

D.6.2 Phase 2 Waste Management

In the Phase 2 planning stages for the CNTA project, historical documentation (e.g., soil analytical data, radiological survey reports, site operations reports, etc.) was reviewed to determine the probable constituency and volume of waste that might be generated on site. Because historical soil sample data showed the presence of chromium at concentrations which exceeded RCRA toxicity characteristic levels, it was presumed that hazardous waste would be generated on site during soil sampling activities. The lack of radiological analytical data, coupled with the site's history of subsurface nuclear testing, mandated a conservative approach that

required certain wastes to be managed as potentially radioactive. The planned site characterization operation also involved the use of a mobile laboratory which would also produce some hazardous waste in the process of performing the required analyses.

D.6.2.1 Waste Generation

The waste management program at CNTA involved four waste types: hazardous (as defined by RCRA - in 40 CFR Parts 261-281) (CFR, 1996), potentially radioactive, hydrocarbon, and sanitary. These wastes originated from two major sources: soil sampling and the mobile laboratory. Soil sampling generated disposable sampling personal protective equipment (PPE), such as gloves, paper, Kimwipes, plastic sampling sleeves, decontamination rinsate, and soil waste. Mobile laboratory operations generated chemical wastes, such as solvents, acids, and soil, as well as laboratory personal protective gear and sampling equipment. Table D.6-1 outlines these waste streams and associated sub-waste streams. Please note that all tables cited in the text are located at the end of this section.

Some soil waste was sent off site to a permitted transportation, storage, and disposal facility as a hazardous waste. Generally soil actively managed as a waste (i.e., containerized, labeled, inspected) must be characterized and properly disposed. In accordance with the waste management strategy outlined in the CNTA CAIP, soil removed from the area of concern to facilitate site characterization was managed as a hazardous waste. As a consequence, this soil was characterized using RCRA waste identification practices.

Soil within the area of concern that was not disturbed during characterization activities was not actively managed as a waste and therefore was not managed under RCRA hazardous waste regulations. Since this site is an historical unit that has not been actively managed and is not a former RCRA permitted waste unit, it does not fall under the purview of RCRA hazardous waste regulations. Instead, such soil is typically regulated under applicable state of federal corrective action regulations. The State of Nevada utilizes risk-based action levels from the EPA Region 9 Preliminary Remediation Goals (PRGs) (EPA, 1996a). The concentrations listed in the PRGs for chromium III and VI are 78,000 mg/kg is 390 mg/kg respectively. Even though some of the waste characterization samples from the mud pit samples exceeded the TCLP maximum concentration of contaminants making them a hazardous waste, the drilling muds left in the pits are not considered.

Table D.6-1
CNTA Waste Streams and Disposal Table

Site Phase	Waste Stream	Sub-Waste Stream	Number of Drums	Contents	Disposal
Phase 1	Soil Sampling Waste	Sampling PPE	2	Gloves, soil, plastic sampling sleeves	Hazardous
		Decontamination Rinsate	1	Trace amounts of hydrochloric acid, nitric acid, isopropanol, soil	Hazardous
Phase 2	Soil Sampling Waste	Decontamination Rinsate	9	Trace amounts of hydrochloric acid, nitric acid, isopropanol, soil; pH = 7	Hydrocarbon
		Sampling PPE with TPH	2	Gloves, soil, plastic sampling sleeves, paper towels, paper	Hydrocarbon
		Sampling PPE	9	Gloves, soil, plastic sampling sleeves, paper towels, paper	Hazardous
	Mobile Laboratory Waste	Solvents	1	Methylene chloride, acetone, methanol	Hazardous
		Acids	1	Hydrochloric acid, nitric acid, sulfuric acid	Hazardous
		Solvent-Extracted Soil	1	Soil, paper filters, glass pipettes	Hazardous
		Laboratory PPE	5	Gloves, soil, glassware, paper towels, paper, pipettes	Hazardous
		Unprocessed Soil Samples	5	Soil contained in glass and poly sample containers	Hazardous

contaminated because they do not have chromium III or VI concentrations which exceed the PRG value (see Section D.1.3.1.2).

D.6.2.2 Waste Accumulation

Three 90-day hazardous waste accumulation areas were established on site in accordance with RCRA waste management regulations. One of these areas served a dual purpose as an accumulation area for both hazardous waste and potentially radioactive waste. All hazardous and potentially radioactive wastes were managed within these three areas in accordance with RCRA regulations (CFR, 1996) and DOE Orders (DOE, 1996) and policies.

D.6.2.3 Waste Characterization

Waste management and Mud Pit CAS characterization samples were obtained as specified in the CAIP and CNTA FI. Samples were collected from soil borings proximal to soil borings with some of the highest reported values of contaminates of concern exceeding the PALs. A total of 12 soil borings were advanced resulting in the collection of 13 soil samples, including a duplicate for QA/QC purposes. These samples were submitted to Lockheed Analytical Services, an off-site analytical laboratory for analysis. These samples provided information to further characterize the individual CASs for purposes of waste management, IDW disposal, and to aid in the determination of potential remedial options. Tables D.6-2 and D.6-3 provide a summary of the analytical results for these samples.

D.6.2.4 Waste Segregation

The on-site mobile laboratory conducted site characterization soil sample analyses for chromium and total petroleum hydrocarbons. To specifically facilitate waste characterization, six waste characterization samples were taken from the major areas on site (UC-1, CMP, UC-3, and UC-4). These waste characterization samples were the only samples analyzed for radiological parameters, in addition to a substantial chemical suite. The review of this radiological data concluded that no radioactive isotopes were detected above background levels for the site. As a result, no radiological waste was generated at the CNTA site.

The mobile and off-site analytical data, in conjunction with process knowledge associated with site activities, were used to determine waste status and arrange for the ultimate disposal of all waste streams. Each subwaste stream was segregated into one of three groupings for waste disposal: hazardous waste, hydrocarbon/nonhazardous waste, and nonhazardous/

Table D.6-2
Analytical Results for CNTA Waste Characterization Samples
(Page 1 of 2)

Sample Number	Sample Collection Date	Location (Area,Pit,Boring)	Sample Description	Analytical Results																																			
						Volatiles				TCLP Metals																	Radiochemical Analysis													
				TPH Diesel (mg/kg)	Data Qualifier	Volatiles (mg/L)	2-Butanone (ug/L)	Data Qualifier	TCLP Semivolatiles (mg/L)	Arsenic (ug/L)	Data Qualifier	Barium (ug/L)	Data Qualifier	Cadmium (ug/L)	Data Qualifier	Chromium (ug/L)	Data Qualifier	Lead (ug/L)	Data Qualifier	Mercury (ug/L)	Data Qualifier	Selenium (ug/L)	Data Qualifier	Silver (ug/L)	Data Qualifier	Tritium (pCi/L)	Error	MDA	Data Qualifier	Gross Alpha (pCi/g)	Error	MDA	Data Qualifier	Gross Beta (pCi/g)	Error	MDA	Data Qualifier
CNT10001	5/15/97	5 ft radius of CMP2, CMP7, and CMP8, 0.0 to 2.0 ft.	Soil Sample	150	X	ND	ND		ND	31.6	B	3520		20	U	5880		20	U	2	U	40	U	20	U	0.12	0.94	1.7		17.7	4.4	3.4		20.9	3.2	3.8	
CNT50001	5/15/97	NA	Trip Blank (water)	NA		ND	ND		NA	NA		NA		NA		NA		NA		NA		NA		NA					NA				NA			
CNT20008	5/15/97	CMP2	Equipment Rinsate (water)	<1.0		ND*	2.6	J	ND	3.0	U	1.0	U	2.0	U	1.0	U	2.0	U	0.2	U	4.0	U	2.0	U	50	100	180		-0.01	0.52	1.1		0.2	1.2	2.1	
CNT30008	5/15/97	Same as CNT10001	Duplicate of CNT10001	300	X	ND	ND		ND	33.8	B	5470		20	U	9730		241		2	U	40	U	20	U	0.7	1.1	1.9		21.9	4.7	3.1		19.4	3.1	3.7	
CNT40008	5/15/97	CMP2	Field Blank (water)	<1.0		ND*	2.7	J	ND	3.0	U	1.0	U	2.0	U	1.0	U	2.0	U	0.2	U	4.0	U	2.0	U	30	100	180		0.06	0.60	1.2		-0.3	1.2	2.1	
CNT10002	5/17/97	U4A2, 6.0 to 10.0 ft.	Soil Sample	91	X	ND	ND		ND	30.0	U	950.0	U	20.0	U	524.0		185.0		2.0	U	40.0	U	20.0	U	0.7	1.0	1.7		16.8	4.3	3.5		36.7	4.0	3.8	
CNT50002	5/17/97	NA	Trip Blank (water)	NA		ND	ND		NA	NA		NA		NA		NA		NA		NA		NA		NA		NA				NA				NA			
CNT10003	5/20/97	U4C5, 0.0 to 3.0 ft.	Soil Sample	140	X	ND	ND		ND	33.9	B	1200	U	20.0	U	3510		20.0	U	2.0	U	40.0	U	20.0	U	-0.05	0.89	1.7		21.3	7.0	6.0		31.6	5.4	5.9	
CNT10004	5/21/97	U4D1, 6.0 to 8.0 ft	Soil Sample	440	X	ND	ND		ND	30.0	U	857	B	20.0	U	473		268		2.0	U	40.0	U	20.0	U	6.8	1.6	1.7		28.2	8.5	7.3	C	32.3	5.7	6.4	
CNT50003	5/20/97	NA	Trip Blank	NA		ND	ND		NA	NA		NA		NA		NA		NA		NA		NA		NA		NA				NA				NA			
CNT10005	5/21/97	5 ft. circle of U3E2, 6.0 to 8.0 ft	Soil Sample	1400	X	ND	ND		ND	70.8	B	1930	B	20.0	U	1300		31.0		2.0	U	40.0	U	20.0	U	0.33	0.93	1.7		9.2	4.8	5.7		18.2	4.2	5.3	
CNT50004	5/21/97	NA	Trip Blank (water)	NA		ND	ND		NA	NA		NA		NA		NA		NA		NA		NA		NA		NA				NA				NA			
CNT10007	5/30/97	2 ft. circle of U1E2, 0.0 to 4.0 ft	Soil Sample	670		ND	ND		ND	30.0	U	1420	U	20.0	U	43.6	B	20.0	U	2.0	U	40.0	U	20.0	U	-0.24	0.83	1.6		13.8	6.1	6.0	C	34.5	5.7	6.3	C
CNT50006	5/30/97	NA	Trip Blank (water)	NA		ND	ND		NA	NA		NA		NA		NA		NA		NA		NA		NA		NA				NA				NA			

Notes on Laboratory Qualifiers:
B = For inorganic compounds, the reported value is less than the Reporting Detection Limit (RDL), but above the Instrument Detection Limit.
C = For radiochemical analyses; the minimum detectable activity exceeded the reporting detection limit (RDL) due to the residue weight limitations forcing a volume reduction.
J = Estimated Value -- (1) constituent detected at a level less than the Reporting Detection Limit (RDL) or Practical Quantitation Limit (PQL) and greater than or equal to the Minimum Detection Limit (MDL); (2 - for CLP reporting only) estimated concentration for Tentatively Identified Compounds (TICs).
U = Compound/element was analyzed for but not detected above Instrument Detection Limit.
X = Analyst-defined qualifier.
No Qualifier = indicates that the reported value exceeds the Reporting Detection Limit (RDL).
ND = The results for all constituents are less than the practical quantitation limit.
ND* = Analyzed constituents were below the practical quantitation limit, with the exception of the detected constituent(s) listed in the following volatiles or semivolatiles columns.
NA = Not Analyzed.

Table D.6-2
Analytical Results for CNTA Waste Characterization Samples
(Page 2 of 2)

Analytical Results																																		
Gamma Spec Analysis																																		
AC-228 (pCi/g)	Error	MDA	Bi-214 (pCi/g)	Error	MDA	Co-57 (pCi/g)	Error	MDA	Co-60 (pCi/g)	Error	MDA	Cs-134 (pCi/g)	Error	MDA	Cs-137 (pCi/g)	Error	MDA	K-40 (pCi/g)	Error	MDA	Pb-212 (pCi/g)	Error	MDA	Pb-214 (pCi/g)	Error	MDA	Th-234 (pCi/g)	Error	MDA	Tl-208 (pCi/g)	Error	MDA	U-235 (gamma) (pCi/g)	Error	MDA
1.39	0.25	0.24	0.80	0.15	0.12	0.008	0.025	0.038	0.009	0.026	0.060	0.006	0.026	0.053	0.049	0.039	0.056	10.9	1.7	0.56	1.35	0.18	0.091	0.86	0.13	0.13	2.49	0.73	2.4	0.450	0.086	0.061	0.16	0.20	0.32
NA			NA			NA			NA			NA			NA			NA			NA			NA			NA			NA			NA		
-11	28	56	-11	15	25	-1.3	2.0	5.6	-3.1	3.7	14	-1.5	3.9	9.2	1.6	7.2	12	-50	110	180	5	12	18	-9	11	21	1	95	270	2.6	8.7	12	-1	33	50
1.41	0.21	0.17	0.82	0.14	0.10	-0.008	0.017	0.036	-0.005	0.017	0.052	0.008	0.020	0.039	-0.009	0.029	0.054	12.2	1.7	0.59	1.28	0.17	0.092	0.90	0.12	0.097	1.40	0.54	1.7	0.462	0.079	0.054	-0.14	0.14	0.33
-11	16	38	7	14	20	-1	1.7	4.6	4.4	4.2	4.5	-2.9	2.8	7.4	0.4	5.7	9.4	18	78	120	3.6	9.5	14	0	11	18	-40	120	180	0.9	7.1	10	-1	26	40
1.51	0.24	0.24	1.32	0.19	0.12	-0.009	0.022	0.041	0.003	0.026	0.064	0.028	0.025	0.046	0.016	0.033	0.054	20.2	2.6	0.63	1.46	0.18	0.093	1.44	0.16	0.12	2.36	0.69	2.3	0.476	0.083	0.058	0.08	0.20	0.35
NA			NA			NA			NA			NA			NA			NA			NA			NA			NA			NA			NA		
1.23	0.23	0.23	1.19	0.19	0.11	-0.009	0.021	0.041	0.006	0.025	0.057	0.037	0.027	0.048	-0.006	0.034	0.070	15.8	2.2	0.60	1.29	0.17	0.092	1.33	0.16	0.12	2.48	0.71	2.4	0.423	0.081	0.060	0.17	0.19	0.33
1.40	0.27	0.28	0.93	0.18	0.14	0.003	0.026	0.040	-0.009	0.026	0.073	0.003	0.024	0.060	-0.045	0.045	0.097	22.5	3.0	0.71	1.45	0.20	0.11	1.17	0.16	0.13	2.2	1.2	1.8	0.511	0.098	0.073	0.08	0.20	0.34
NA			NA			NA			NA			NA			NA			NA			NA			NA			NA			NA			NA		
1.16	0.16	0.14	0.77	0.12	0.082	-0.005	0.018	0.037	0.001	0.016	0.034	0.009	0.015	0.034	0.022	0.026	0.042	11.3	1.4	0.40	1.13	0.14	0.070	0.91	0.11	0.083	1.96	0.82	6.3	0.336	0.058	0.042	0.1	0.16	0.27
NA			NA			NA			NA			NA			NA			NA			NA			NA			NA			NA			NA		
1.66	0.18	0.13	0.94	0.13	0.080	0.012	0.015	0.025	-0.004	0.015	0.035	0.008	0.014	0.029	-0.001	0.023	0.035	23.1	2.5	0.40	1.58	0.18	0.058	1.13	0.11	0.061	1.21	0.45	1.5	0.498	0.067	0.034	0.12	0.13	0.21
NA			NA			NA			NA			NA			NA			NA			NA			NA			NA			NA			NA		

Table D.6-3
Analytical Results for CNTA Mud Pit Characterization Samples

Sample Number	Sample Collection Date	Location (Area, Pit, Boring)	Sample Description	Analytical Results																									
						Volatiles								TCLP Metals															
				TPH Diesel (mg/kg)	Data Qualifier	Volatiles (mg/L)	Data Qualifier	2-Butanone (ug/kg)	Data Qualifier	Trichloroethene (mkg/L)	Data Qualifier	TCLP Semivolatiles (mg/L)	Data Qualifier	Arsenic (ug/L)	Data Qualifier	Barium (ug/L)	Data Qualifier	Cadmium (ug/L)	Data Qualifier	Chromium (ug/L)	Data Qualifier	Lead (ug/L)	Data Qualifier	Mercury (ug/L)	Data Qualifier	Selenium (ug/L)	Data Qualifier	Silver (ug/L)	Data Qualifier
CNT10006	5/30/97	U3E1, 6.0 to 8.0 ft	Soil Sample	1800	X	ND		ND		ND		ND		30.0	U	892	B	20.0	U	757		20.0	U	2.0	U	40.0	U	20.0	U
CNT10008	5/30/97	U3E3, 6.0 to 8.0 ft	Soil Sample	400	X	ND		ND		ND		ND		30.0	U	480	B	20.0	U	174		20.0	U	2.0	U	40.0	U	20.0	U
CNT50005	5/30/97	N/A	Trip Blank (water)	NA		ND *		2.2	J	ND		NA		NA		NA		NA		NA		NA		NA		NA		NA	
CNT10009	5/31/97	CMP6, 0.0 to 4.0 ft	Soil Sample	100		ND *		ND		0.018	J	ND		30.0	U	1620	B	20.0	U	2080		53.7		2.0	U	40.0	U	20.0	U
CNT10010	5/31/97	CMP11, 0.0 to 4.0 ft	Soil Sample	530	X	ND		ND		ND		ND		30.0	U	3080		20.0	U	3100		117		2.0	U	40.0	U	20.0	U
CNT50007	5/31/97	N/A	Trip Blank (water)	NA		ND		ND		ND		NA		NA		NA		NA		NA		NA		NA		NA		NA	
CNT10011	6/1/97	U1S2, 0.0 to 2.0 ft	Soil Sample	810		ND		ND		ND		ND		30.0	U	1760	B	20.0	U	52.6	B	3900		2.0	U	40.0	U	20.0	U
CNT10012	6/3/97	U1S1, 0.0 to 4.0 ft.	Soil Sample	2100		ND		ND		ND		ND		30.0	U	1680	B	20.0	U	41.3	B	20.0	U	2.0	U	40.0	U	20.0	U
CNT50008	6/3/97	N/A	Trip Blank (water)	NA		ND		ND		ND		NA		NA		NA		NA		NA		NA		NA		NA		NA	

Notes on Laboratory Qualifiers:

B = For inorganic compounds, the reported value is less than the Reporting Detection Limit (RDL), but above the Instrument Detection Limit.

J = Estimated Value -- (1) constituent detected at a level less than the Reporting Detection Limit (RDL) or Practical Quantitation Limit (PQL) and greater than or equal to the Minimum Detection Limit (MDL); (2 - for CLP reporting only) estimated concentration for Tentatively Identified Compounds (TICs).

U = Compound/element was analyzed for but not detected above Instrument Detection Limit.

X = Analyst-defined qualifier.

No Qualifier = indicates that the reported value exceeds the Reporting Detection Limit (RDL).

ND = The results for all constituents are less than the practical quantitation limit.

ND* = Analyzed constituents were below the practical quantitation limit, with the exception of the detected constituent(s) listed in the following volatiles or semivolatiles columns.

NA = Not Analyzed.

nonhydrocarbon waste. The detailed tracking of soil sampling waste by borehole made such segregation possible. Table D.6-4 shows the breakdown of these groupings in relation to the individual bags of waste.

D.6.2.5 Waste Disposal

Because no radioactive waste was generated at CNTA, there were only three waste types which required disposal: hazardous waste, hydrocarbon waste, and sanitary waste.

The hazardous waste stream consisted of liquid chemicals, solvent-extracted soil, laboratory personal protective equipment (PPE), unprocessed soil samples, and sampling PPE. The presence of chromium above the RCRA Toxicity Characteristic Leaching Procedure maximum concentration of contaminants in the samples associated with this waste this waste be determined hazardous (CFR, 1996). There were 22 drums that were characterized as hazardous waste.

The hydrocarbon/nonhazardous waste stream consisted of decontamination rinsate and sampling PPE. A waste was determined to fit into this category if it was nonhazardous and if the concentration of TPH (total) was greater than 100 mg/kg. These concentrations were based on the State of Nevada contaminated soil and groundwater regulations (NAC, 1997). There were nine drums of decontamination rinsate and two drums of sampling PPE.

All hazardous and hydrocarbon/nonhazardous waste generated at CNTA was transported off site to a permitted Treatment, Storage, and Disposal facility. The nonhazardous/nonhydrocarbon waste was characterized as sanitary waste and was disposed of in the Tonopah sanitary landfill.

Table D.6-4
CNTA Waste Segregation Table
(Page 1 of 2)

Drum No.	Borehole No.	Waste Status
UC1PPE01	Entire Volume	Hazardous waste
UC1PPE02	Two cores labeled CMP	Hazardous waste
	U1C (ALL), U1D (ALL), Two cores labeled UC-1	Nonhazardous, nonhydrocarbon
UC1PPE03	U1S2, CNT10007	Hazardous waste
	U1B (ALL), U1E5, U1E4, U1S4, U1E6, U1A3, U1A4	Nonhazardous, nonhydrocarbon
	U1E2, U1E1, U1E3, U1S1, U1S3, U1A5, U1A6	Hydrocarbon, nonhazardous
UC1PPE04	CMP-6, -11, -12, U1S2	Hazardous waste
	U1S5, U1S6, U1E8, U1S7, U1A7, U1A8, U1A9, U1Y4, U1Y5	Nonhazardous, nonhydrocarbon
	U1A1, U1A2	Hydrocarbon, nonhazardous
UC1PPE05	U1Y (ALL, except U1Y1)	Nonhazardous, nonhydrocarbon
	U1A2, U1Y1	Hydrocarbon, Nonhazardous
UC4PPE01	U4A1, U4B1, U4B4, U4A6, U4A5, U4A2, U4A3, U4B5, U4B2, U4A4, U4D4, U4B3, U4E2, U4B6, Decon Bag	Hazardous waste
	U4E1	Nonhazardous, nonhydrocarbon
UC4PPE02	Entire Volume	Hazardous waste
UC4PPE03	U4S5, U4S6, U4S2, U4X1, U4S4, U4W2, U4A2, U4X1, U4D6+U4D3, U4A1+U4A2, U4D1, U4D4, U4D2, U4A5, U4A3+U4A4	Hazardous waste
	U4S8	Nonhazardous, nonhydrocarbon
UC4PPE04	U4A6, U4D5, U4D1, U4S13, U4S11	Hazardous waste
	U4S9, U4S10, U4D8, U4C11, U4C10, U4B7, U4B2+U4B4+U4B5+U4B6 (2' TO 4'), U4D7, U4A8, U4S14, U4A7, U4S12	Nonhazardous, nonhydrocarbon

Table D.6-4
CNTA Waste Segregation Table
(Page 2 of 2)

Drum No.	Borehole No.	Waste Status
UC3PPE01	U3E3, U3E6, U3E2, U3A1	Hazardous waste
	DRY RUN BAG, U3A2, U3A3, U3C3, U3E5, U3C2, U3C1	Nonhazardous, nonhydrocarbon
UC3PPE02	U3B1, U3E1	Hazardous waste
	U3E4, U3E10, U3E13, U3E14, U3E15, U3E16, U3E18	Hydrocarbon, nonhazardous
	U3C3, U3D4, U3C6, U3A4, U3A5, U3C5, U3A6, U3D1, U3D2, U3E17	Nonhazardous waste, nonhydrocarbon
UC3PPE03	UCX3, UCX1, U3E1, U3E3, U3X2	Hazardous waste
	UC3NVOE2, U3E22, U3E23, U3U1	Hydrocarbon, nonhazardous
	U3B4, U3D5, U3B2, U3B3, U3D6, U3B6, U3D3, U3B5, U3E19, U3E20, U3E21, U3E24, U3E25	Nonhazardous waste, nonhydrocarbon
UC3PPE04	U3Y2, U3Z2, U3Z4, U3Z1, U3X5, U3Y5	Hazardous waste
	U3Z3, U3S4, U3E1 TO U3E6 (0'-2'), U3E10, U3E11	Hydrocarbon, nonhazardous
	U3Y3, U3X4, U3S2, U3Y4, U3S1, U3S3, U3E9, U3E7, U3E8	Nonhazardous, nonhydrocarbon
UC3PPE05	U3Z6, U3Z5, U3Z8, U3S5, U3Z7, U3Z9, U3E12, U3U2, U3U3, U3U4, U3U5	Nonhazardous, nonhydrocarbon
UC3PPE06	U3B1 TO U3B6 (0'-4'), U3D1 TO U3D6 (0'-4'), U3C1 TO U3C6 (0'-4'), U3A1 TO U3A6 (0'-4')	Nonhazardous, nonhydrocarbon

D.7.0 Additional Surface Investigation

This section includes the results of the June 1998 field investigation of additional sites discovered during the performance of the *Corrective Action Investigation Plan for Central Nevada Test Area CAU 417 (CAIP)* (DOE/NV, 1997), and through historical documentation searches and site walks. The resulting investigation data was conducted through the implementation of the *Addendum to the Corrective Action Investigation Plan for Central Nevada Test Area, CAU No. 417* (CAIP Addendum) (DOE/NV, 1998). The field investigation conducted in May and June 1997, described in earlier sections of this report, identified follow-up work that was required to complete the investigation of the site. The ESC techniques used during the 1997 investigation were not applicable and not used during the June 1998 investigation.

Characterization activities were conducted during a 10-day work period by the following contractors: IT, Alliance Environmental, Inc., and Bechtel Nevada. IT Corporation was responsible for directing Alliance Environmental, Inc. to the proper drilling locations, and was responsible for the collection, handling, and submittal of soil samples to the laboratory. IT Corporation was also responsible for the appropriate handling and disposal of investigation-derived wastes generated over the course of the project. Alliance Environmental, Inc. was the drilling subcontractor, and was responsible for providing the roto-sonic drilling equipment, decontaminating their core barrels and other drilling equipment, and drilling at the appropriate location to the required depth. Bechtel Nevada assisted IT in locating the extent of the septic lines in the support trailer parks, excavated and removed the underground storage tanks (USTs), closed the two septic tanks in place, and conducted various housekeeping site cleanup duties. All work was conducted in accordance with the NDEP-approved *CAIP Addendum* (DOE/NV, 1998).

D.7.1 Purpose

This section provides information about the new CASs; describes the field investigations conducted in October 1997, April 1998, and June 1998; and presents the results of those investigations. The purposes of the field activities were to investigate the new CASs, complete investigation of a CAS which could not be fully investigated during the 1997 field efforts, and to close the USTs and septic tanks.

D.7.2 Scope of Work

The scope of work of the Addendum CAIP (DOE/NV, 1998) included investigating nine newly identified CASs and completing the investigation of one CAS that was started in June of 1997. The investigations involved:

- Collecting water and solid samples from the two USTs to characterize the material, and guide tank removal and disposal.
- Closing both USTs.
- Sampling a burn pit to determine if *Resource Conservation and Recovery Act* (RCRA) constituents are present.
- Collecting water and solid samples from two septic tanks to characterize the material, and guide tank and septic system closure.
- Closing the two septic tanks.
- Locating and sampling septic leachfields at three sites to determine if they had been used for the disposal of any hazardous substances. This required tracing the septic lines and cutting trenches with a backhoe to collect soil samples.
- Characterizing the decontamination facility pit by collecting soil samples from six locations utilizing roto-sonic drilling methods.
- Determining the extent of contamination at the U3E Southern Outlier by drilling a minimum of three new drill holes utilizing roto-sonic drilling methods.

D.7.3 Summary of Activities

The May and June 1997 field activities were conducted using ESC methods, allowing newly identified sites to be investigated during that event (Table D.7-1). Descriptions of these sites and the investigation that occurred from May through June 1997, are described in earlier sections of this report. CAS numbers were assigned, as applicable, after the field efforts were completed.

Preliminary work conducted in order to complete the surface investigation of CAU 417 in June 1998 included reviewing historical documentation to locate information on suspected CASs, conducting a site visit in October 1997 to confirm the location of newly identified CASs,

Table D.7-1
Additional Corrective Action Sites
Identified and Investigated in May through June 1997

CAS Number	General Site Name	FFACO Description	Location	Level of Investigation
UC-1 Area				
58-10-03	UC-1 Shaker Pad Area (U1S)	Shaker Pad Area	UC-1	Located, mapped, sampled.
58-44-05	Grout Pile NE of UC-1	Grout Pile	Northeast of UC-1	Located, mapped, sampled.
58-44-06	UC-1 Area Y (U1Y)	Grout Pile	South of UC-1 support trailer park	Located, mapped, sampled.
UC-3 Area				
58-10-06	UC-3 Area X (U3X)	Drilling mud and cuttings	North of UC-3	Located, mapped, sampled.
58-25-01	UC-3 Southern Outlier (U3E)	Spill, Southern Outlier	South of UC-3 Mud Pit E	Located and mapped. Sampling not completed in 1997.
UC-4 Area				
58-10-04	UC-4 Area W (U4W)	Shaker Pad Area	Arroyo south of UC-4 drill site	Located, mapped, sampled.
58-10-05	UC-4 Area X (U4X)	Shaker Pad Area	Arroyo north and east of UC-4 drill site.	Located, mapped, sampled.
No CAS assigned.	UC-4 Area Y (U4Y)	Not Assigned	Geophysical anomaly identified east of UC-4.	Located, mapped, sampled. Not contaminated.

and a preliminary site sampling event in April 1998 to characterize the contents of the USTs and septic tanks.

A site visit was done on October 28 and 29, 1997, in order to field verify potential new CASs located during the review of historical documentation. The following sites were field verified at that time: septic lines at the Support Trailer Park areas of UC-1, UC-3, and UC-4 (CASs 58-05-01, 58-05-02, and 58-04, respectively), a septic tank covered by two manhole covers at UC-3 (58-05-05), a UST at UC-3 Recording Trailer Park (58-05-03), a septic tank at UC-3 Recording Trailer Park (58-05-06), and a burn area at the UC-3 Recording Trailer Park (58-35-02). Miscellaneous debris, assigned to housekeeping sites, was also located. The October

1997 site visit also verified that CAS 58-07-01 and CAS 58-35-01 are one location; the Decontamination Facility. This is described in Section D.7.4.2.

The Addendum CAIP (DOE/NV, 1998) was written to guide the investigation of the new CASs. A list of these CASs, their location, and the level of investigation to be conducted is summarized on Table D.7-2. General locations of the new CASs are presented on Figure D.7-1.

A preliminary sampling event, conducted under the Addendum CAIP (DOE/NV, 1998), took place on April 15 and 16, 1998, in order to expedite work scheduled for June 1998. The following CASs were sampled: the septic tank at UC-3 (58-05-05), the UST near the UC-3 Support Trailer Park (58-99-01), the UC-3 Recording Trailer Park UST (58-05-03), the septic tank at the UC-3 Recording Trailer Park (58-05-06), and the burn pit at the UC-3 Recording Trailer Park (58-35-02). A total of 15 samples, including quality assurance (QA) samples, were collected and sent to an off-site laboratory for analysis during the April 1998 field work.

The results of the sampling showed that the two septic tanks and the burn pit did not have any contamination concentrations above PAL identified in the Addendum CAIP (DOE/NV, 1998). The results also showed that the USTs contained TPH concentrations above 100 mg/kg and would have to be handled as a hydrocarbon waste. The results of the sampling at these locations are discussed in detail in the following sections.

The investigation and characterization efforts at CAU 417 were conducted over a two-week period from June 8 to June 19, 1998. Work was conducted over a period of 10 working days, with work being suspended for the weekend of June 13 and 14. Nine new CASs were investigated and one partially investigated CAS (58-25-01) was completed. A total of 105 samples, including QA samples, were collected and sent to an off-site laboratory for analysis during the June 1998 field work.

Work conducted to complete the surface investigation of CAU 417 in June 1998 included shallow soil sampling to determine the horizontal and vertical extent of contamination at the UC-3 Southern Outlier (58-25-01); locating and sampling the outfalls of the septic lines related to the UC-1, UC-3, and UC-4 support trailer parks (58-05-01, 58-05-02, and 58-05-04); verifying the presence or absence of contamination at the UC-1 decontamination facility (58-07-01 and

Table D.7-2
Summary of Addendum CAIP CASs
Investigated in April and June 1998

CAS	General Site Notation	FFACO Description	Location	Level of Investigation
UC-1 Well Area				
58-05-01	UC-1 Septic Lines	Septic System	UC-1 Support Trailer Park	Located, mapped, sampled.
58-07-01	Decontamination Facility-Backfilled decon. pit (U1Z)	Decon. Facility Pit	West of CMP	Located, mapped, sampled.
58-35-01	Decontamination Facility-Asphalt Pad	Burn Area	West of CMP	Same site as 58-07-01.
UC-3 Well Area				
58-05-02	UC-3 Septic Lines	Septic System	Support Trailer Park east of UC-3	Located, mapped, sampled.
58-05-03	UST at UC-3 Recording Trailer Park (RTP)	Underground Storage Tank	UC-3 RTP, south of UC-3 drill site	Excavated, sampled, and backfilled with clean soil.
58-25-01	UC-3 Southern Outlier (U3E)	Spill	South of UC-3 Mud Pit E	Sampled to define vertical and horizontal extent.
58-99-01	UC-3 UST (U3U)	Protruding Pipes (2)	Southeast of UC-3 drill site, near Support Trailer Park	Excavated, sampled, and backfilled with clean soil.
58-05-05	Manhole covers over septic tank	Septic System	Southeast of UC-3 drill site.	Sampled, pumped, and filled with clean backfill.
58-05-06	UC-3 RTP septic tank	Septic System	UC-3 RTP, south of UC-3 drill site.	Sampled, and filled with clean backfill.
25-35-02	Burn Pit at UC-3 RTP	Burn Area	UC-3 RTP, south of UC-3 drill site.	Located, mapped, and sampled.
UC-4 Well Area				
58-05-04	UC-4 Septic lines	Septic System	West of UC-4 Mud Pit A.	Located, mapped, and sampled.

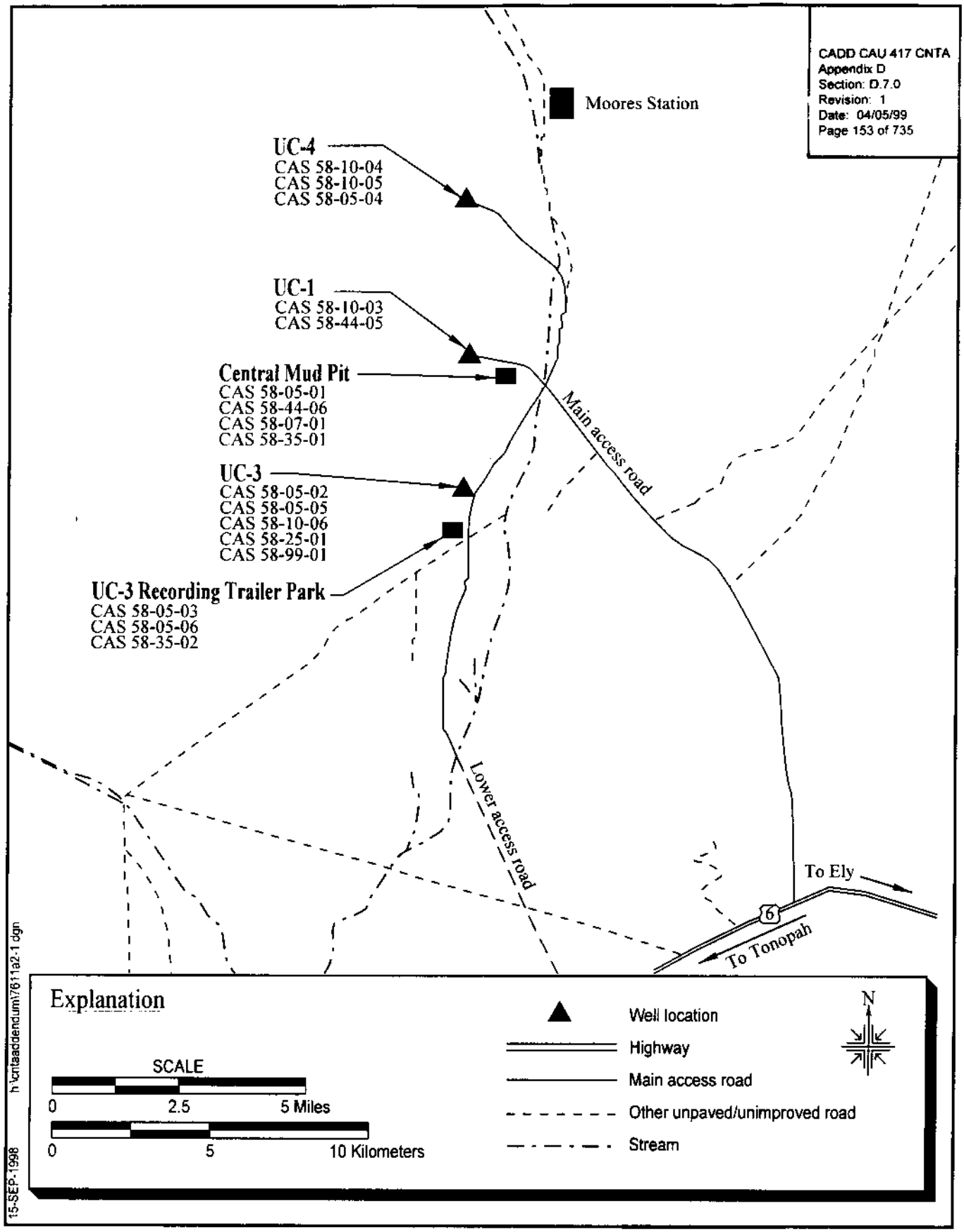


Figure D.7-1
Location Map of Additional CASs, Central Nevada Test Area,
Nye County, Nevada

58-35-01); verification sampling and removing the two USTs (58-99-01 and 58-05-03); and closing in place the two concrete septic tanks (58-05-05 and 58-05-06).

The COPCs for the septic system are typical of those associated with light industrial sites. Historical construction diagrams for the recording trailer park at UC-3 suggest that a photographic laboratory was connected to the septic system; therefore, chemicals associated with photo processing laboratories may have been released. Petroleum based products (oils and grease) may also have been released to the septic system during site operations. In addition, solvents may have been used for cleaning equipment, especially at the decontamination facility pit. Based on site knowledge from previously acquired data and historical records, the COPCs for the following areas are:

- Septic Systems: TPH, RCRA metals, volatile organic compounds (VOCs), SVOCs.
- Decontamination Facility (CAS 58-07-01): TPH, RCRA metals, SVOCs, and radionuclides.
- Underground Storage Tanks: Benzene, toluene, ethylbenzene, and toluene (BTEX), TPH, and RCRA metals.
- U3E Southern Outlier (CAS 58-25-01): TPH and RCRA metals.
- Burn Area (CAS 58-35-02): RCRA metals.

D.7.3.1 Radiological Monitoring

The Central Nevada Test Area was decommissioned in 1973 and demobilized. Radiological surveys performed in 1973 and 1986 did not detect radioactive contamination on the site surface (AEC, 1974, and REECo, 1986). Soil samples collected during field activities in May and June 1997 were screened for radiation, and none of these samples exceeded two times the measured background level.

Soil samples collected during the June 1998 field activities were also screened for radioactivity. Radiological screening was conducted in accordance with the Corrective Action Investigation Plan (DOE/NV, 1997), the Addendum to the Corrective Action Investigation Plan (DOE/NV, 1998), the Field Instructions (IT, 1998a), the Site Specific Health and Safety Plan (IT, 1998b), and appropriate IT Standard Quality Procedures (IT, 1993 as amended). Radiological screening instruments were checked against sources and background activity was

calculated each day prior to beginning field activities. The Preliminary Action Level was set at two times the average measured background level.

A Ludlum Measurements Inc. Model 3™ was used to measure gross gamma radiation. A NE Technology Electra™ was used to measure gross gamma radiation. A NE Technology Electra™ was used to measure gross alpha and gross beta radiation.

No samples exceeded two times measured background level. Only soil samples from the UC-1 Decontamination Facility Pit (CAS 58-07-01) were analyzed for radiological results through Gamma Spectroscopy. Results are presented in Attachment K, Table K-8. Laboratory results were reviewed and no usual radiological levels were detected.

The field investigation results and characterization data provided in this report will provide the basis for preparation of the *Corrective Action Decision Document for the Central Nevada Test Area* which will provide corrective action alternatives for the CASs investigated in CAU 417. All work on this project was conducted in accordance with the *Federal Facility Agreement and Consent Order* (1996), the *RCRA* (CFR, 1998), the *Industrial Sites Quality Assurance Plan* (DOE/NV, 1996), and all applicable NDEP policies and regulations (NDEP, 1995).

D.7.4 UC-1 Additional Surface Investigation

CASs that were investigated at UC-1 in June 1998 were the UC-1 Support Trailer Park septic system (CAS 58-05-01), and the Decontamination Facility (CASs 58-07-01 and 58-35-01).

D.7.4.1 UC-1 Support Trailer Park Septic System (CAS 58-05-01)

This CAS was confirmed from historical photos and a site visit in October 1997 (see Figure D.7-2). A support trailer park was established west of the CMP area during CNTA drillback operations in the late 1960s. No anomalies were noted about this area during a previous surface geophysical investigation conducted in September 1996; however, the October 1997 inspection of this area confirmed the presence of a southeast-trending line of pipes sticking up from the ground. These pipes are constructed of a composite material that looks like black tar paper; therefore, were not identifiable through geophysical methods. Three of the tar paper pipes

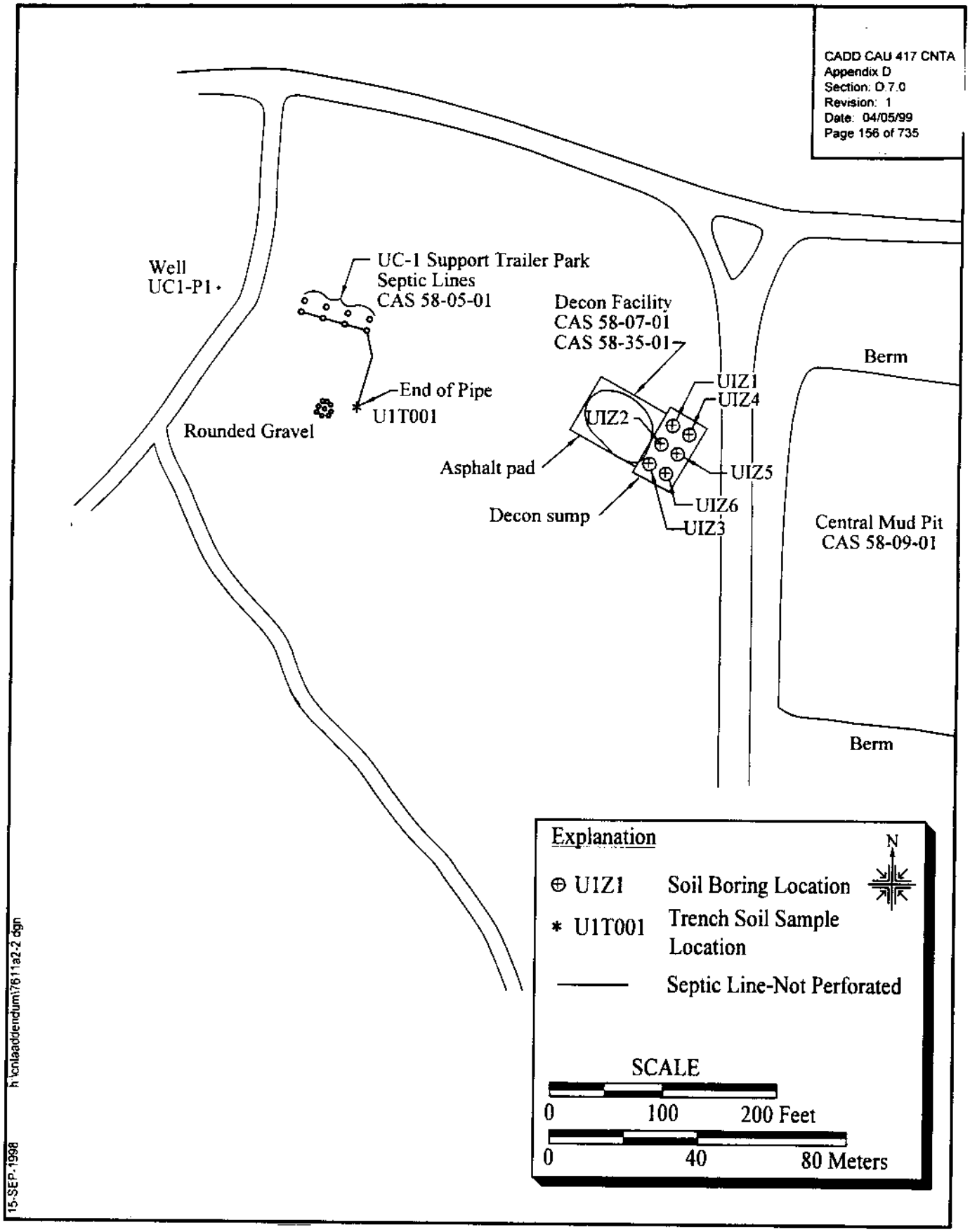


Figure D.7-2
Location Map of UC-1 Support Trailer Park
Septic System and Decontamination Facility

are 10 cm (4 in.) in diameter and approximately 0.7 to 1 m (2 to 3 ft) deep, straight down. Four other tar-paper pipes are also 10 cm (4 in.) in diameter, but are approximately 0.3 to 0.7 m (1 to 2 ft) deep and are curved to the southeast at the bottom. The set of 10-cm (4-in.) diameter tar paper pipes that are curved at the bottom are connected to the septic line. Exploration of the other set of vertical tar paper pipes, revealed that these are access pipes to valves connected to a 2.5-cm (1-in.) metal pipe; probably a water supply line. This arrangement of two sets of 10-cm (4-in.) tar paper pipes with a 2.5-cm (1-in.) metal pipe was observed at the septic systems for the other support trailer parks, as well. The 2.5-cm (1-in.) metal pipe was not observed at the surface at the UC-1 location, but it was observed at the surface at the UC-3 and UC-4 locations.

An irregular circle of rounded gravel, measuring approximately 8 by 9 m (28 by 30 ft), was located approximately 28 m (93 ft) southwest of the easternmost vertical pipe. Initially, it was thought to be the leachfield associated with the septic line. However, during the June 1998 investigation, it was found that the UC-1 Support Trailer Park septic line did not connect with the rounded gravel. The gravel was upgradient of the end of the UC-1 septic line and is only surfical, with silty soil underneath. This was determined by digging a 0.3-m (1-ft) deep hole at the approximate center of the irregular circle.

A downhole video camera was used to explore and trace the septic lines at the Support Trailer Parks at UC-1, UC-3, and UC-4. The camera was advanced through the 10-cm (4-in.) tar paper pipe until it encountered an obstruction, then the distance covered and direction the camera traveled were noted and the camera was removed from the pipe. A measuring tape, compass, and some exploratory digging were used to locate the pipe just beyond the obstruction. A trench was then dug using a shovel and/or a backhoe to uncover the pipe. The pipe was broken at the new location and the camera was reinserted to continue the exploration process.

The UC-1 Support Trailer Park septic line was completely traced in this manner. The septic line ended abruptly at the northern edge of an arroyo, up-gradient of the CMP (CAS 58-09-01), and down-gradient of the rounded gravel area. Exploration was done at the end of the pipe to see if the pipe continued further into the arroyo. A 4.5-m (15-ft) long by 1-m (3-ft) wide trench was dug perpendicular to the end of the pipe to locate any distribution lines for a septic field. Only an elbow of black pipe of indeterminant orientation was found in the trench, and no other pipe was encountered. The downhole video camera revealed that the black tar paper pipe was solid the entire length with no perforations, junction boxes, or other intersecting pipes observed.

One soil sample (U1T001) was collected from the soil underneath the end of the pipe ending in the arroyo. All samples were screened for gross alpha and beta, and gamma with the appropriate radiologic/monitoring instrument. No unusual levels were detected in sample U1T001. Unusual levels would be considered twice ambient background on the meters (DOE/NV, 1998). A Hanby field test kit was used in conjunction with a photoionization detector (PID) to determine if trenching spoils could be used to backfill the trench. The determining criteria was whether the Hanby kit indicated the presence of TPH above 100 parts per million (ppm) or if the PID read levels above 20 ppm for closed system testing (DOE/NV, 1998). If either test failed these criteria, the trenching spoils could not be used for backfill. Waste characterization samples would be then be collected from the spoils and analyzed for TPH, RCRA metals, VOCs, and SVOCs. The spoils pile would be covered while pending analysis. This screening procedure was also used during the investigation at the UC-3, and UC-4 septic lines. Results from the Hanby kit and PID analysis of the spoils pile, at the end of the UC-1 septic line were negative and the trench was backfilled. Laboratory results from sample U1T001 are included in Attachment K.

Results from TPH and VOC analysis were at nondetectable levels. RCRA metals results and SVOC that were detected in sample U1T001 are below limits established by the EPA Region 9 PRGs for Industrial Soils (EPA, 1996a).

D.7.4.2 Decontamination Facility Pit (CAS 58-07-01) and Burn Area (CAS 58-35-01)

A radiological decontamination facility pit was constructed at UC-1, west of the UC-1 CMP during the operations conducted in the late 1960s. This facility was used to decontaminate downhole drilling equipment and other instruments potentially subject to post-shot radioactivity. A surfical radiological survey in 1973 did not detect any radioactivity within the pit, so the fence surrounding the facility was removed, and the pit was backfilled (AEC, 1973b). Because the 1973 survey only considered radiological constituents, additional investigations for possible chemical constituents were conducted.

The decontamination facility pit was constructed as an asphalt pad with a gentle slope that drained the decontamination fluids to a pit lined with an asphalt-plastic membrane. According to historical photographs this facility was located west of the CMP (CAS 58-09-01). The February 1996 site reconnaissance described CAS 58-35-01 as a burn area near some degraded asphalt west of the CMP. During the October 1997 site walk, it was determined that what was thought to be burned material was actually the remains of the asphalt plastic liner used in the

decontamination facility pit. CAS 58-35-01 was improperly classified as a burn area and is actually a part of CAS 58-07-01, the decontamination facility pit.

The June 1998 investigation of CAS 58-07-01 consisted of using a sonic drill rig to core six borings to a depth of 3 m (10 ft) in the area of the decontamination pit at the southeast end of the asphalt pad (Figure D.7-2). Composite samples were taken from each boring at 0.6-m (2-ft) intervals to total depth. A cross-section and soil boring logs are included in Attachment L. Samples were analyzed for RCRA metals with mercury, SVOCs, TPH, and radionuclides through gamma spectroscopy. Analytical results are presented in Attachment K. In summary, RCRA metals and the SVOCs were less than EPA PRGs. Arsenic ranged from 8.6 to 29 mg/kg. Barium ranged from 70 to 180 mg/kg. Cadmium ranged from nondetectable to 0.260 mg/kg. Chromium ranged from nondetectable to 7.1 mg/kg. Lead ranged from 11 to 44 mg/kg. Selenium was only detected in one sample (U1Z60204) at 0.82 mg/kg. Mercury and silver were not detected in any of the soil samples. Only Bis(2-ethylhexyl)phthalate, a SVOC, was detected in one sample U1Z60002 at an estimated value of 0.077 mg/kg; below the EPA PRG (EPA, 1996a). No other SVOCs were detected in any of the soil samples from the Decon Facility pit. TPH was not detected in any of the soil samples. No elevated levels of radionuclides were detected during field screening or through laboratory analysis.

D.7.5 UC-3 Additional Surface Investigation

The CASs that were investigated at UC-3 in June 1998 were 58-05-02, 58-05-03, 58-05-05, 58-05-06, 58-25-01, 58-35-02, and 58-99-01.

D.7.5.1 Septic System at UC-3 Support Trailer Park (CAS 58-05-02)

A support trailer park was established during drilling operations at the UC-3 area in the early 1970s. This site was identified and confirmed during a field inspection in October 1997. The area was not previously investigated by geophysical methods or sampling. The site consists of a line of vertical pipes located to the east of UC-3 (Figure D.7-3). There are five 10-cm (4-in.) diameter polyvinyl chloride pipes and two 10-cm (4-in.) diameter tar paper pipes in an east trending line. The field investigation of this CAS was conducted in the same manner as at CAS 58-05-01, using a combination of the downhole video camera and digging with a shovel or backhoe to locate the pipe when the camera encountered an obstruction.

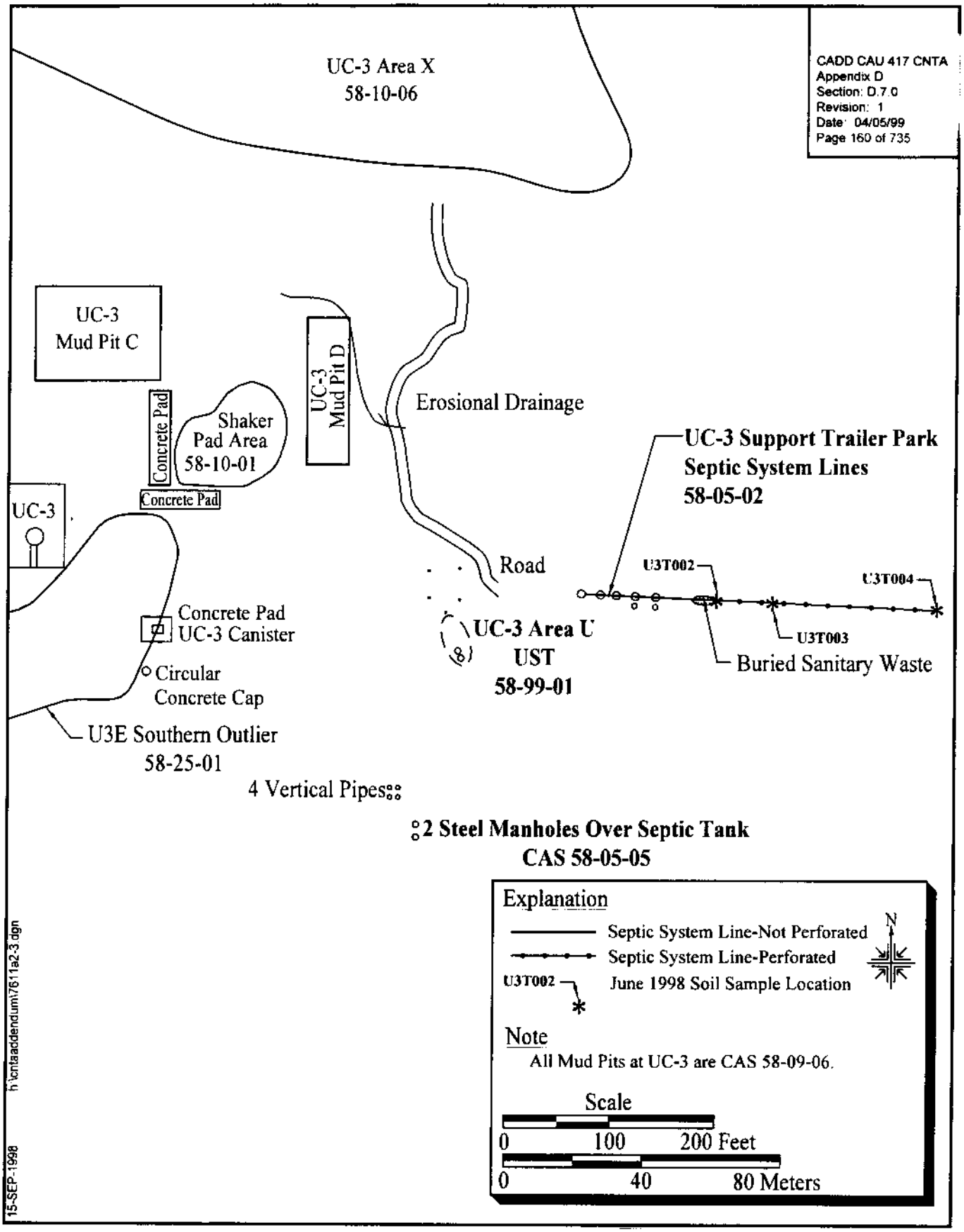


Figure D.7-3
Location Map of UC-3 Support Trailer Park Septic System, Septic Tank, and Underground Storage Tank

Exploration of the septic lines at the UC-3 Support Trailer Park found that the septic line continued for a total of 81.7 m (268 ft) almost due east from the easternmost vertical pipe. The septic line was solid for the first 14 m (46 ft), and perforated to the end; a length of 67.2 m (222 ft). No intersecting pipes, junction boxes, or septic tanks were encountered along the line.

Three grab samples (U3T002, U3T003, and U3T004) and two waste characterization samples (U3T001 and U3T005) were collected and analyzed for TPH, RCRA metals, VOCs, and SVOCs. U3T002 was collected from beneath the septic line in Trench #1 at the beginning of the perforated pipe, a distance of 14 m (46 ft) from the easternmost vertical pipe. The septic line was 1 m (3 ft) below ground surface (bgs). Trench #1 was excavated at 12 m (38 ft) east of the easternmost vertical pipe. The trench was cut through a 1- by 2-m (4- by 6-ft) depression identified in October 1997 as a possible leachfield. Sanitary trash was discovered buried above the septic line, but no leachfield materials were found. Sanitary trash was not encountered in any of the other trenches at UC-1 or UC-4.

U3T003 was collected from beneath the septic line in Trench #2, at a distance of 30 m (100 ft), and a depth of 1 m (3.5 ft) bgs. U3T004 was collected from beneath the septic line in Trench #3, at a distance of 79 m (258 ft), and a depth of 2 m (5.5 ft) bgs. This was only 3 m (10 ft) from the end of the pipe. Analytical results are presented in Attachment K. In samples U3T002, U3T003, and U3T004, arsenic ranged from 5.5 to 5.9 mg/kg. Barium was estimated to range from 110 to 140 mg/kg. Cadmium ranged from 130 to 170 mg/kg, but these values are less than the contract required detection limit but greater than or equal to the instrument detection limit (IDL). Chromium ranged from non detect to 4.3 mg/kg. Lead ranged from 12 to 25 mg/kg. Mercury, selenium, and silver were not detected in these samples. Total petroleum hydrocarbon diesel was detected in U3T002 at an estimated level of 14 mg/kg. No VOCs were detected in these samples; however, some SVOCs were detected (Attachment K, Table K-4).

The soil samples had polycyclic aromatic hydrocarbon (PAH) concentrations that exceeded the EPA Region 9 PRGs for industrial soils (EPA, 1996a). However, subsequent sampling, conducted on August 18, 1998, showed that the PAHs were from the material the septic lines were constructed of (the black tar paper composite material) and not the result of hydrocarbon

disposal through the septic system. Sample U3T008 was collected along with sample U3T006 from UC-3 Trench #1, but sample U3T008 was deliberately contaminated with fragments from the black, septic line. Samples U3T006 and U3T007 were collected at approximately the same locations at U3T002 and U3T003, and attempted to avoid including fragments of the septic line. The PAHs were at higher concentrations in the samples collected in June and in U3T008. These results are presented in Table K.1-4 of Attachment K.

U3T001 is a waste characterization sample of the soil excavated from Trench #1. U3T005 is a waste characterization sample of the soil excavated from Trench #3. A Hanby field kit was used in conjunction with a PID to determine if trenching spoils could be used to backfill the trenches upon completion of sampling. The criteria was whether the Hanby kit indicated the presence of TPH above 100 ppm or if the PID read levels above 20 ppm for closed system testing (DOE/NV, 1998). The results from the field screening indicated that the soil from Trench #1 was approximately 250 ppm for waste oil, and the soil from Trench #3 was less than 200 ppm for waste oil. Field screening from Trench #2 was negative. Since the trenching spoils from Trench #1 and #3 failed the field screening, waste characterization samples U3T001 and U3T005 were collected and sent to a laboratory to be analyzed for TPH, RCRA metals, VOCs, and SVOCs. The spoils piles were then covered with plastic until verified results were received from the laboratory. A review of the sample results for waste characterization samples U3T001 and U3T005 revealed the following: RCRA metals were not detected in concentrations which exceeded the regulatory level (40 CFR 261.24) (CFR, 1998), no other RCRA-listed constituents were detected, and TPH levels were below 100 mg/kg. The spoils piles have been used as backfill for their associated trenches.

D.7.5.2 Underground Storage Tank at UC-3 Recording Trailer Park (CAS 58-05-03)

According to historical site specifications, a fuel system for the electrical generators was installed at the UC-3 Recording Trailer Park. The UST at the UC-3 Recording Trailer Park was located and confirmed during the October 1997 site visit. Two vertical steel pipes, one 5.1 cm (2 in.) in diameter and the other 10 cm (4 in.) in diameter, were found connected to an apparent UST. The

vertical pipes are located approximately 6.1 m (20 ft) east of a concrete pad identified on historical site plans as a generator house. No geophysical work was conducted in this area during earlier investigations (Figure D.7-4).

Sludge from the bottom of the UST was sampled in April 1998 in order to facilitate the field work scheduled for June 1998. Sample CNTA5008 was analyzed for BTEX, RCRA metals, and TPH. The BTEX were at nondetectable levels, as were RCRA metals for cadmium, mercury, selenium, and silver. However, arsenic was detected at 3.0 mg/kg, barium at 52.1 mg/kg, chromium at 6.1 mg/kg, and lead at 7.9 mg/kg. In addition, the sample results for TPH indicated 310 mg/kg of waste oil, which is above the PAL of 100 mg/kg.

Since the TPH sampling results indicated only the presence of hydrocarbons above the PALs, the UST was removed during the June 1998 field activities and the contents of the tank, and the impacted soil were disposed of as hydrocarbon waste.

The UST at CAS 58-05-03 was excavated and removed on June 16, 1998. This UST consisted of three 55-gallon drums in a row connected with pipes. The area under this UST was over excavated since evidence was found during excavation and removal activities, that the tank had leaked. Confirmation samples U3U201 and U3U202 were collected from approximately 0.3 m (1 ft) below the UST at the north and south ends of the UST, respectively. Field screening for TPH in the excavated soil was done with a Hanby kit at 0.3 m (1 ft) and 1 m (3 ft) below the UST, or approximately 1.5 m (5.5 ft) and 3.3 m (11 ft) bgs. Field screening showed 200 ppm gas or 300 ppm motor oil at approximately 1.5 m (5.5 ft) bgs, less than 100 ppm of motor oil or gasoline at approximately 2 m (8 ft) bgs, and 100 ppm gasoline or 150 ppm motor oil at 3.3 m (11 ft) bgs. The final excavation measured approximately 2 by 3 m (7.5 ft by 10 ft), and 3.3 m (11 ft) deep. The TPH diesel results at the bottom of the excavation were 9.9 mg/kg and 25 mg/kg, well below the 100 mg/kg action limit. Analytical results for UST soil confirmation samples are presented in Attachment K. All the excavated soil was containerized and shipped to the Nevada Test Site (NTS) Area 6 Hydrocarbon Landfill for disposal and the excavation was backfilled with native material. Confirmation samples collected from the bottom of the tank excavation showed that all hydrocarbon-impacted soil had been removed.

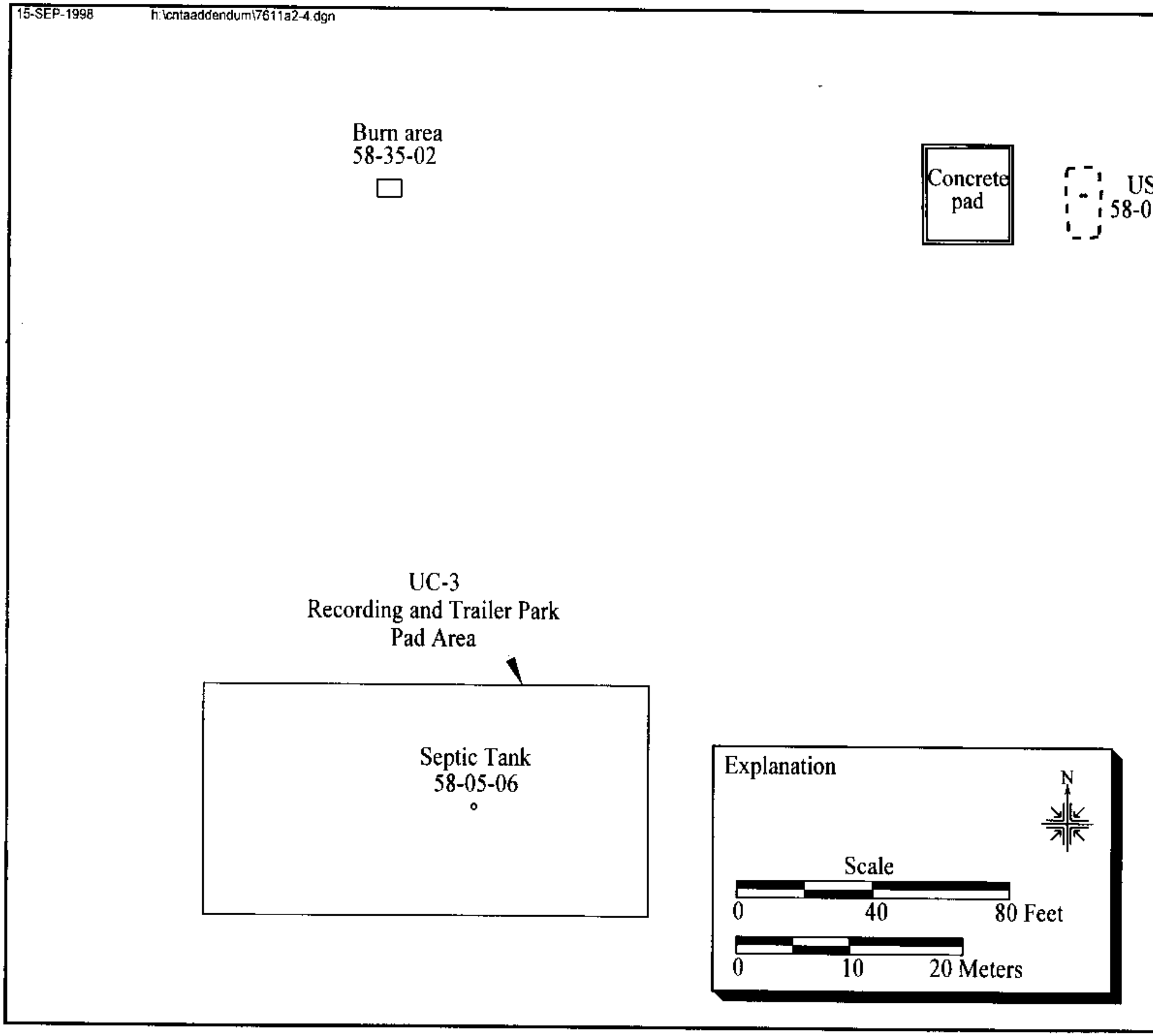


Figure D.7-4
Location Map of UC-3 Recording Trailer Park,
Underground Storage Tank, Septic Tank, and Burn Area

D.7.5.3 Septic System Southeast of UC-3 (CAS 58-05-05)

The surficial evidence for this system is two steel manhole covers located due south of the UST (CAS 58-99-01), and southeast of the UC-3 drill hole (Figure D.7-3). As-built drawings showed this septic tank to be constructed of concrete with a capacity of 11,355 liters (L) (3,000 gallons [gal]). The manhole covers were identified by both visual inspection and geophysical surveys. The contents of this tank were sampled and analyzed in April 1998. Liquid samples CNTA5001, and solid samples CNTA5002 and CNTA5003 (duplicate of CNTA5002) were collected and analyzed. Analytical results from these samples did not indicate any contaminants of concern above the PALs. Analytical results are presented in Attachment K.

In order to complete closure activities, 7,570 L (2,000 gal) of fluid were pumped from the tank and taken to an appropriate facility for disposal. The concrete tank was left in place and backfilled with clean native material at the completion of the June 1998 sampling activity. This septic tank was closed in place according to *Nevada Administrative Code* (NAC) 444.818(18) (1996a). Since there were no COPCs in the septic tank, the leachfield was also assumed to be clean and was not located or sampled.

D.7.5.4 Septic Tank at UC-3 Recording Trailer Park (CAS 58-05-06)

The septic tank at the UC-3 recording trailer park was discovered and sampled during the April 1998 preliminary sampling event. Sample CNTA5015 was collected from some residual solids at the bottom of the concrete tank, since there was no liquid present. Analytical results did not indicate any contaminants of concern above the PALs from that sample. Analytical results are presented in Attachment K. This tank was left in place and backfilled with clean native material at the completion of the June 1998 sampling activity. This septic tank was closed in place according to NAC 444.818(18) (1996a). Since there were no COPCs in the septic tank, the leachfield was also assumed to be clean and was not located or sampled.

D.7.5.5 TPH Soil Contamination at U3E Southern Outlier (CAS 58-25-01)

During the May through June 1997 sampling event this diesel fuel contaminated area was discovered while investigating the UC-3 Mud Pit E. A total of 72 direct-push samples were collected from 15 locations during that sampling event. Twenty-two of the samples had TPH values exceeding 100 mg/kg. Chromium was not found in any of the samples. The vertical extent of contamination could not be determined in two locations. Borings U3E10 and U3E16, advanced with the direct-push drilling method, encountered refusal at 5.6 m (18.5 ft) and

3 m (10.0 ft) respectively while still in contaminated soil. The lateral extent of contamination was well constrained except to the south where boring U3E21 was still contaminated at the surface. Boring U3E21 also had 90.1 mg/kg TPH from 1.8 to 2.4 m (6 to 8 ft). Specific text describing the 1997 field investigation of the UC-3 Mud Pit E Southern Outlier can be found in Section D.5.3.5 of this Appendix D.

Three additional borings were drilled with a roto-sonic drill rig, to complete defining the vertical and horizontal extent of contamination at the U3E Southern Outlier. A total of 37 soils samples were collected from the three locations and submitted to an off-site laboratory for analysis. Boring U3E26 was advanced next to U3E10, boring U3E27 was advanced next to U3E16, and boring U3E28 was advanced 15 m (50 ft), south 20 degrees west of U3E21 (see Figure D.7-5). A cross section and soil boring logs for borings U3E26, U3E27, and U3E28 are included in Attachment L.

Maximum depth of TPH contamination, above 100 mg/kg in U3E26 was in the interval of 6.1 to 6.7 m (20 to 22 ft) at 290 mg/kg. TPH levels did not exceed 100 mg/kg in either U3E27 or U3E28. The highest concentration of TPH contamination in U3E27 was an estimated 17 mg/kg at the interval of 0.6 to 1.2 m (2 to 4 ft). The highest concentration of TPH contamination in U3E28 was at the interval of the surface to 0.6 m (2 ft) at 56.0 mg/kg. See Attachment K for analytical results. These three borings completed defining the vertical and horizontal extent of contamination at CAS 58-25-01.

D.7.5.6 Burn Area at the UC-3 Recording Trailer Park (CAS 58-35-02)

This CAS was identified and confirmed during the October 1997 site visit. According to the historical site plan, the burn area is situated next to the location of the former Cable Building (see Figure D.7-4). During the October 1997 site visit, burned joist hangers, nails, and wiring were observed on the ground in an area that measured 2.4 m (8 ft) north to south, by 3 m (10 ft) east to west. The area has not been previously investigated by geophysical methods or sampling. In this area, the soil at a depth of 2.5 cm (1 in.) was described as very dark, and fine grained for a thickness of 2.5 cm (1 in.). A hot fire was indicated by the melted glass and metal present. Six samples from three locations were collected; three at the surface and three at a depth of 0.3 m (1 ft), and analyzed for RCRA metals. Analytical results are presented in Attachment K.

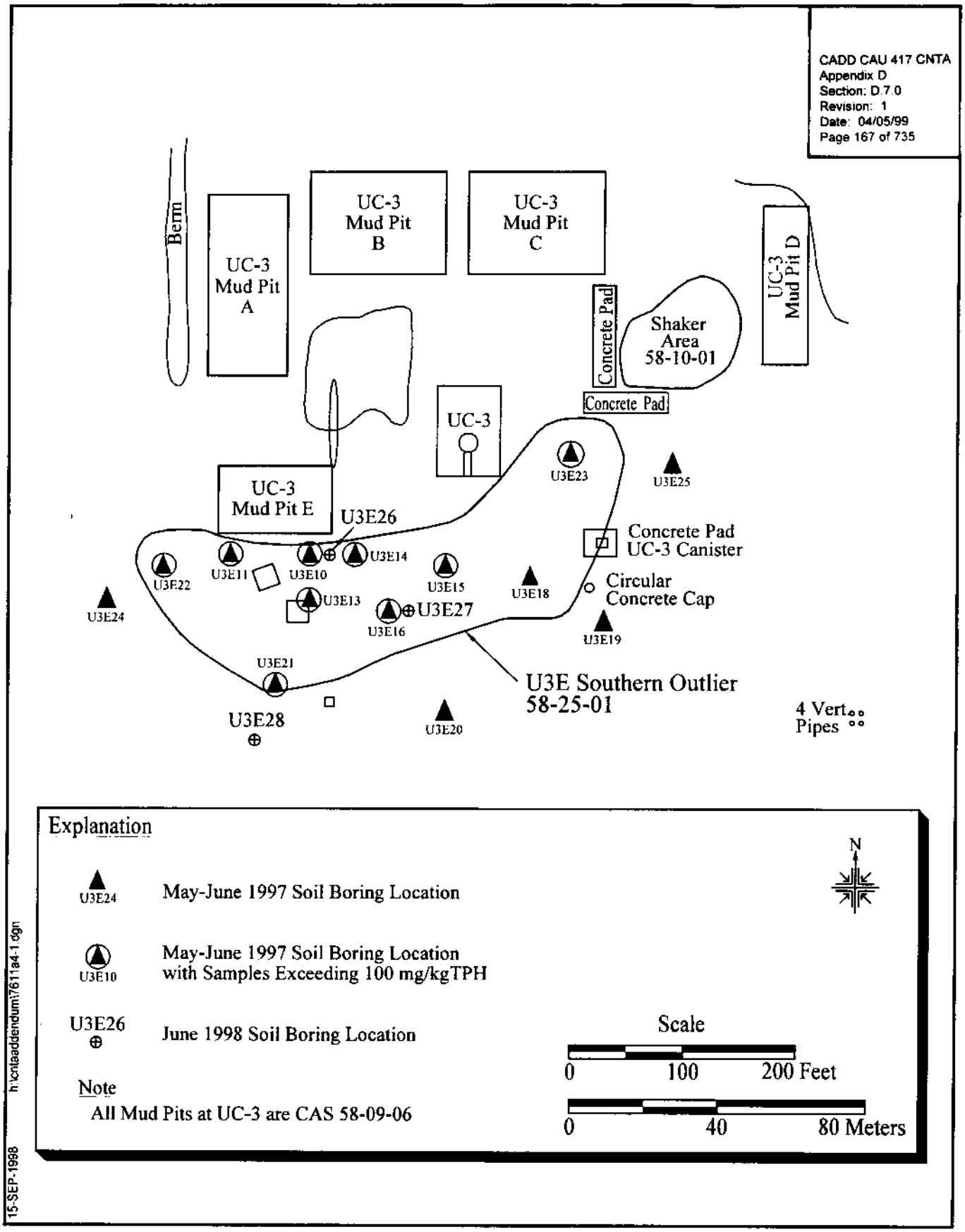


Figure D.7-5
U3E Southern Outlier Additional Boring Locations

Metals levels did not exceed regulatory limits and the area was considered not contaminated. No further action was taken this site during the June 1998 sampling event.

D.7.5.7 Underground Storage Tank at UC-3 (CAS 58-99-01)

CAS 58-99-01 was first described as two protruding pipes, possibly related to an UST, located southeast of the UC-3 emplacement well. This area was sampled with the direct-push drilling method in May and June 1997, and is described in detail in Section D.5.3.7 of this report. To summarize the 1997 data, five borings were advanced within the site of UC-3 Area U and sampled to depths of between 1.83 and 8.66 m (6 and 12 ft) bgs. TPH diesel/motor oil contamination was found within the U3U1 boring between the intervals of 1.2 to 1.8 m (4 to 6 ft) and 1.8 to 2.4 m (6 to 9 ft), with combined TPH concentrations of 595 mg/kg and 3,209 mg/kg respectively. The four borings advanced around boring U3U1 did not encounter TPH contamination in excess of the PAL of 100 mg/kg.

The contents of this tank were sampled during the preliminary sampling in April 1998 so the UST could be closed during the June 1998 field effort. Analytical results from the samples collected from the UST, indicated the presence of TPH above the PAL. Analytical results are presented in Attachment K.

The UST at CAS 58-99-03 was excavated and removed on June 16, 1998, after approximately 265 L (70 gal) of hydrocarbon contaminated fluid was pumped out of the UST and solidified for transport. During excavation it was found that this tank was constructed of four connected 55-gallon drums. Evidence was found during excavation and removal activities that the tank had leaked and the area under this UST was over excavated. Two confirmation samples, U3U101 and U3U102, were collected at the bottom of the excavation, from approximately 0.3 m (1 ft) below the UST at the west and east sides of the UST, respectively. Field screening for TPH in the excavated soil was done with a Hanby kit at approx. 0.3 m (1 ft) and 1.2 m (4 ft) below the UST, or approximately 1.5 m (5.5 ft) and 2.7 m (9 ft) bgs. Field screening showed approximately 1,000 parts per million (ppm) diesel at approximately 1.5 m (5.5 ft) bgs, and less than 100 ppm of motor oil or gasoline at approximately 2.7 m (9 ft) bgs. The final excavation measured approximately 3 by 3 m (10 ft by 10 ft), and 3.3 m (11 ft) deep. Confirmation samples U3U104 and U3U105, taken at a depth of 3.3 m (11 ft) from the east and west sides of the excavation, respectively, had TPH results of 9.8 mg/kg TPH and 23 mg/kg of TPH; well below the 100 mg/kg action limit.

Analytical results are presented in Attachment K. Confirmation samples collected from the bottom of the tank excavation showed that all hydrocarbon-impacted soil above 100 mg/kg had been removed. The hydrocarbon contaminated soil, the solidified fluid, and the four UST drums were shipped to the NTS Area 6 Hydrocarbon Landfill for proper disposal.

D.7.6 UC-4 Additional Surface Investigation

Only one CAS, 58-05-04, was investigated at the UC-4 area in June 1998.

D.7.6.1 Septic System at UC-4 Support Trailer Park (CAS 58-05-04)

This area was investigated with surface geophysical surveys as part of the earlier investigation conducted in September 1996. The septic system had not been identified at that time. This site was reevaluated during the October 1997 field inspection, since photographic evidence showed trailers at this location during drilling operations.

The UC-4 Support Trailer Park is located west of UC-4 Mud Pit A (Figure D.7-6). Geophysics conducted during the September 1996 investigation showed fairly uniform background conductivities across the Support Trailer Park site. There were no indications of a UST, buried debris, or a septic leachfield. The October 1997 field investigation verified the series of northeast trending pipes and a possible leachfield located about 15.2 m (50 ft) southeast of the southernmost pipe, under a large patch of brush. The surface exposure of CAS 58-05-04 consists of a line of five 2.5-cm (1-in.) diameter, 15-cm (6-in.) tall, metal pipes set next to a line of four 10-cm (4-in.) diameter, less than 1 m (3.3 ft) deep, straight tar paper pipes. Parallel to these pipes, about 1.5 m (5 ft) to the west, are seven 10-cm (4-in.) diameter, tar paper pipes, 0.3 to 0.5 m (1 to 1.5 ft) deep, with a southward bend at the bottom.

The septic line at the UC-4 Support Trailer Park was traced in the same manner as at UC-1 and UC-3. By investigating with the downhole video camera and trenching, the septic line was traced 114 m (373 ft) southeast, from the southernmost vertical pipe to the end at the edge of an arroyo above the UC-4 Area W (CAS 58-10-04).

A total of three soil samples were collected from beneath the septic line (Figure D.7-7). Sample U4T001 was collected from below the beginning of the perforated pipe, a distance of 65.3 m

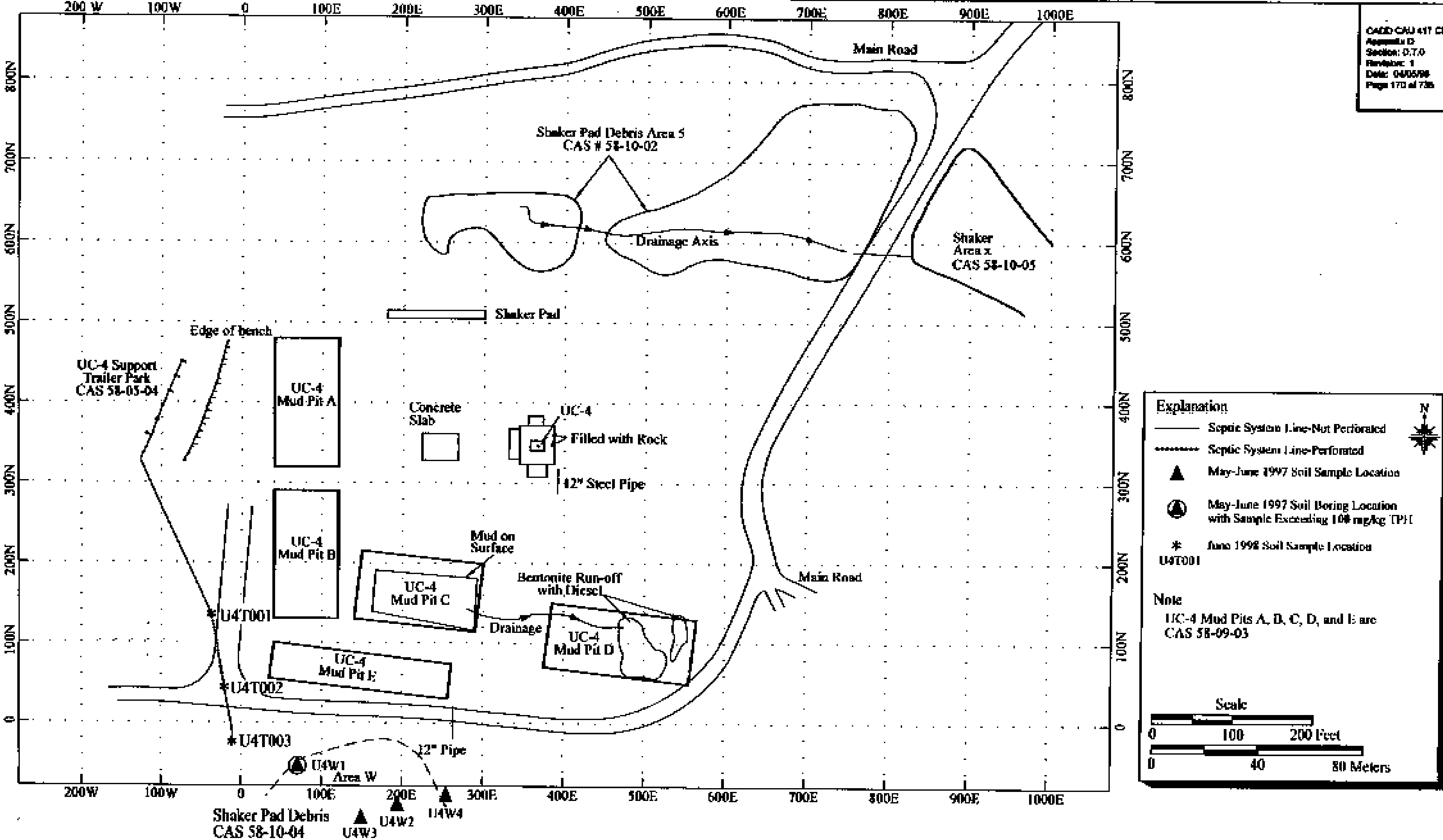


Figure D.7-6
UC-4 Area Map Showing CAS Locations

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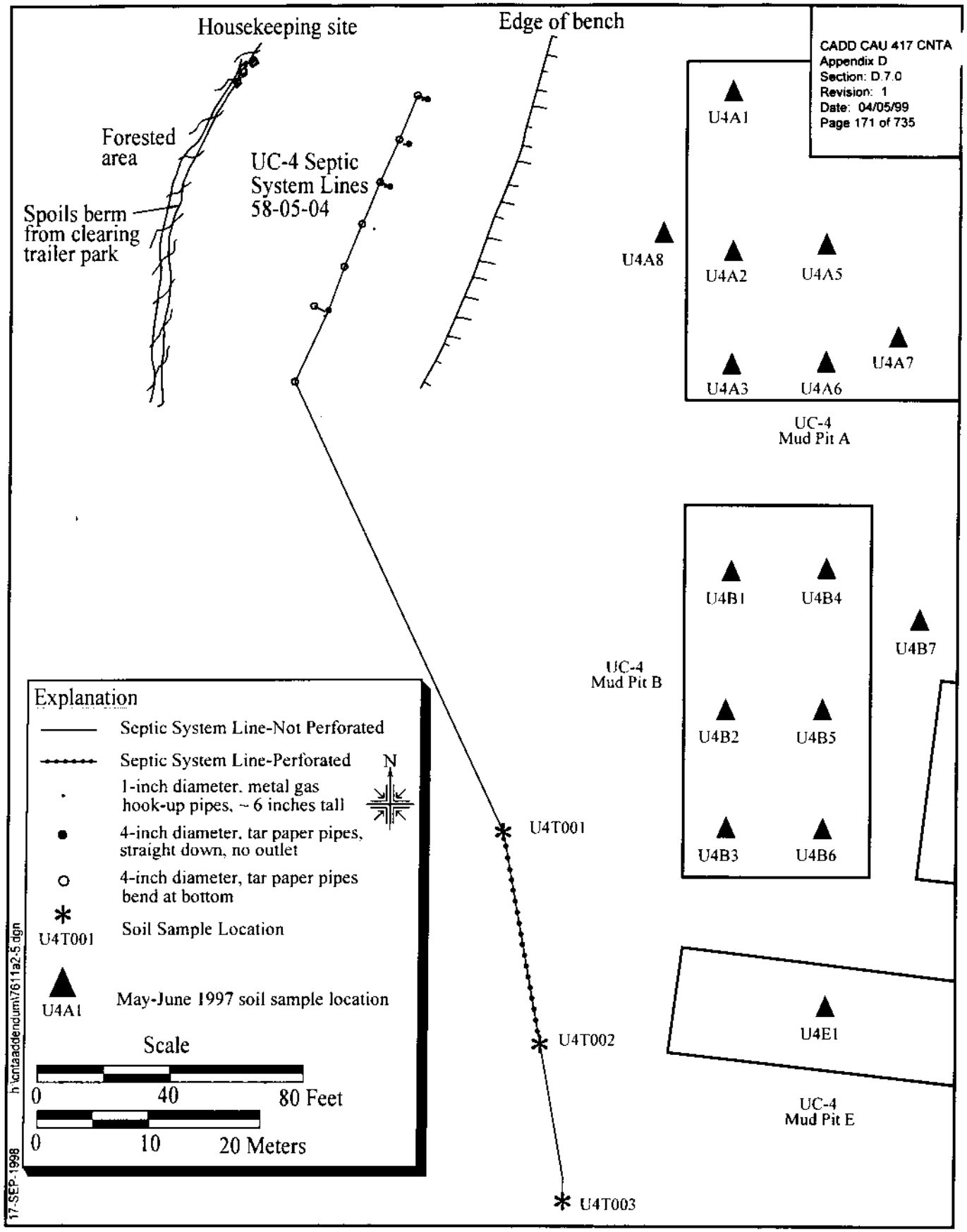

Figure D.7-7
UC-4 Support Trailer Park, Septic System

(214 ft) from the southernmost pipe. The depth of sample U4T001 was 53-cm (21-in.). Sample U4T002 was collected from the soil below the end of the perforated pipe, a distance of 94 m (308 ft). The depth of the sample U4T002 was 58-cm (23-in.). U4T003 was collected at the end of the pipe, at the edge of the arroyo at a distance of 113.9 m (374 ft). The depth of sample U4T003 was 25.4 cm (10 in.).

Sample results for CAS 58-05-04 are included in Attachment K. In samples U4T001, U4T002, CNT31005 (duplicate sample of U4T1002), and U4T003, arsenic ranged from 4.5 to 7.6 mg/kg. Barium ranged from 85 to 120 mg/kg. Cadmium ranged from nondetect to 0.24 mg/kg. Chromium ranged from nondetect to 15 mg/kg. Lead ranged from 4.5 to 9.1 mg/kg. Mercury, selenium, and silver were not detected in these samples. The TPH was 13 mg/kg in sample U4T001; well below the PAL of 100 mg/kg. The VOC analysis detected acetone at 0.85 mg/kg in sample U4T002.

The PAHs detected in the SVOCs analysis in sample U4T003 were in excess of the EPA Region 9 PRGs for industrial soils (EPA, 1996a). Subsequent sampling conducted on August 18, 1998, showed that the PAHs were from the material the septic lines were constructed of and not the result of hydrocarbon disposal through the septic systems. Sample U4T004 was collected at approximately the same location as U4T003. Care was taken to avoid including fragments of the black septic line, and concentrations of detected SVOCs are lower in U4T004 than in U4T003. Sample U3T008 was collected at CAS 58-05-02 from UC-3 Trench 1 and deliberately contaminated with fragments of the septic line to verify the presence of PAHs. The PAH levels in this sample are much higher than the soil samples. These sample results are presented in Table K-4 of Attachment K.

D.7.7 Waste Management During Additional Surface Investigations

Investigation-derived waste generated during the CNTA Addendum sampling activities was managed according to regulatory requirements, field observations, and the results of laboratory analysis of site characterization samples. The overall waste management strategy employed at the newly identified CASs closely followed the strategy found in the CAIP (DOE/NV, 1997). Due to the differences in the type of investigation proposed and the COPCs at these new sites, a departure from the specifics of the CAIP was warranted. The waste streams anticipated at the newly identified CASs were the same as those identified in the CAIP (DOE/NV, 1997) with the exception of the trenching spoils.

Historical documentation (e.g., soil analytical data, radiological survey reports, site operations reports, etc.) was reviewed to determine the probable constituents and volume of waste that might be generated on site. A presampling event was conducted in April 1998 to determine if hazardous constituents were present in the septic tanks, USTs, and burn area. The site investigation also involved the use of a hydrocarbon field screening kit that produced hazardous waste during sample processing.

D.7.7.1 Waste Management Program

The development of a waste management program for CNTA involved four waste types: nonhazardous/nonhydrocarbon (sanitary), hydrocarbon, hazardous (as defined by RCRA in 40 CFR 261) (CFR, 1998), and potentially radioactive waste. Ultimately, all of these waste types were generated during the soil sampling activity at CNTA, with the exception of radioactive waste. No radioactive waste was generated at the CNTA. The waste generated consisted of solid and liquid waste, including disposable PPE (i.e., gloves), paper towels, plastic sampling scoops, excess soil waste, decontamination rinsate water, and spent solvents. Further details of the management of each waste type are found in the ensuing discussion.

D.7.7.1.1 Nonhazardous/Nonhydrocarbon Waste

Wastes meeting the criteria for nonhazardous/nonhydrocarbon waste (sanitary) were generated at UC-1 and UC-4. Sanitary waste consisted of sampling PPE, plastic liners used underneath the drill equipment, paper trash, and decontamination rinsate. All containerized (i.e., drummed) waste categorized as sanitary waste was shipped to and disposed of by a permitted commercial Treatment, Storage, and Disposal Facility (TSDF) in California.

Additional liquid sanitary waste was generated in preparation for closure of the septic tank system at CAS 58-05-05. Prior to filling the septic tank with an inert material, 7,570 L (2,000 gal) of liquid sanitary waste was pumped directly into a tanker truck and shipped off site to a sanitary waste treatment system.

D.7.7.1.2 Hydrocarbon/Nonhazardous Waste

Hydrocarbon wastes were generated at UC-3. This waste stream consisted of soil excavated from the USTs, the seven metal drums that made-up the two USTs, liquid that was removed from the tanks and solidified, all decontamination rinsate associated with UC-3, and sampling PPE.

At the septic system locations (CAS 58-05-01, 58-05-02, and 58-05-04) where exploratory trenching occurred, all trenching spoils (excavated soil) were field screened for the presence of hydrocarbons with the Hanby kit and screened for VOCs with a PID by doing a headspace test. No staining and/or odors were noted during the septic system trenching. Spoils from Trench #1 and Trench #2 at CAS 58-05-02 (UC-3 Support Trailer Park septic system) were used to backfill the trenches when laboratory results were returned that indicated the soil was not RCRA hazardous waste and met the State of Nevada hydrocarbon standard (NAC, 1996a).

The excavation spoils from the two UST excavations were also field screened for petroleum hydrocarbons. These spoils contained concentrations of petroleum hydrocarbons ranging from 100 to 1,000 mg/kg. As a result, these spoils were determined to be petroleum hydrocarbon waste and were subsequently transported off site to the NTS for disposal in the hydrocarbon landfill. Clean, native material from the CNTA site was used to backfill the UST excavations.

With the exception of the soil excavated during the removal of the USTs, all soil removed from trenches during the June 1998 sampling event was eventually used to backfill the original trenches. The excavated UST soil, the seven metal drums that comprised the two USTs, and five drums of hydrocarbon soil, and debris were transported to the NTS Area 6 Hydrocarbon Landfill for disposal. The decontamination rinsate and sampling PPE was shipped to and disposed of by a permitted commercial TSDF in California.

D.7.7.1.3 Hazardous Waste

As a result of the use of the hydrocarbon field screening test kit, hazardous waste was generated at all three CNTA sites. The hazardous waste stream consisted of liquid spent solvents, solvent-extracted soil, and test kit PPE. This waste stream was generated entirely as a result of processing samples for the hydrocarbon field screening kit. One drum and three (5-gal) buckets were characterized as hazardous waste due to the presence of known spent solvents (carbon tetrachloride and heptane) and a reactive element (anhydrous aluminum chloride). This waste was sent to and disposed of by a permitted commercial TSDF in California.

D.7.7.2 Waste Accumulation

A hazardous waste accumulation area was established at each of the three investigation sites for the accumulation of wastes generated during sampling and UST removal. These accumulation areas were designed and maintained in accordance with RCRA hazardous waste management

regulations. The UC-1 area served as an accumulation area for both hazardous and potentially radioactive waste. At this area only, a Radioactive Materials Area was established within the boundaries of the hazardous waste accumulation area. Wastes generated at UC-1 were dually managed as RCRA hazardous waste and as potential radioactive waste in accordance with the Nevada Test Site Waste Acceptance Criteria requirements, until analytical data confirmed that radiological constituents were within background levels.

D.7.7.3 Waste Characterization

Field screening, laboratory analytical data results, and process knowledge associated with site activities, were used to determine waste status and arrange for the ultimate disposal of all waste streams. Each waste stream was segregated into one of three groupings for waste disposal: hazardous waste, hydrocarbon/nonhazardous waste, and nonhazardous/nonhydrocarbon waste. No radioactive waste was generated at CNTA. The detailed tracking of waste generated through soil sampling of boreholes and trenching made such segregation possible. Tables D.7-3, D.7-4, and D.7-5 show the waste inventory for the drums that were located at UC-1, UC-3, and UC-4.

Table D.7-3
UC-1 Waste Inventory

Drum Number	Contents	Associated Sample/Borehole Number[a]	Detected Analytes[b]	Waste Determination
UC10001	Plastic liner	U1Z1 - U1Z6	--	Sanitary
UC10002	Soil	U1Z1 - U1Z6	--	Sanitary
UC10003	Decontamination Rinsate	U1Z1 - U1Z6	--	Sanitary
UC10006	Decontamination Rinsate	U1Z1 - U1Z6	--	Sanitary
UC10007	Decontamination Rinsate	U1T001	--	Sanitary
UC10004	Sampling PPE	U1Z1 - U1Z6	--	Sanitary
UC10005	Hanby Kit Waste	All UC-1 sampling	Process Knowledge: Carbon Tetrachloride Heptane Anhydrous Aluminum Chloride	Hazardous Waste[b] (D003, D019, F001, D001)

[a]Only the detected analytes which caused the waste to be characterized hydrocarbon or hazardous are listed.
[b]Hanby waste contains spent solvent mixtures, associated PPE, and reactive catalyst powder/residue.

Table D.7-4
UC-3 Waste Inventory

Drum Number	Contents	Associated Sample/Borehole Number	Detected Analytes[a]	Waste Determination
CNTA5000	Sampling PPE	CNTA5005 CNTA5008 U3E26[b]	Waste Oil (570 mg/kg) Waste Oil (310 mg/kg) TPH-Diesel - (Range: ND - 3,500 mg/kg)	Hydrocarbon Waste
UC301	Decontamination Rinsate	U3E26[b]	TPH-Diesel - (Range: ND - 3,500 mg/kg)	Hydrocarbon Waste
UC302	Decontamination Rinsate	U3E26[b]	TPH-Diesel - (Range: ND - 3,500 mg/kg)	Hydrocarbon Waste
UC308	Hanby Kit Waste	All UC-3 sampling	Lab Analysis: TPH-Diesel - (Range: ND - 3,500 mg/kg) Process Knowledge: Carbon Tetrachloride Heptane Anhydrous Aluminum Chloride	Hazardous Waste[c] (D003, D019, F001, D001)
NA[d]	Liquid from the UC-3 UST	CNTA5004	---	Sanitary
NA	Sludge from the UC-3 Underground storage tank (UST)	CNTA5005	Waste Oil (570 mg/kg)	Hydrocarbon Waste
NA	UC-3 UST	CNTA5005	Waste Oil (570 mg/kg)	Hydrocarbon Waste
NA	Sludge from the UC-3 RTP UST	CNTA5008	Waste Oil (310 mg/kg)	Hydrocarbon Waste
NA	UC-3 RTP UST	CNTA5008	Waste Oil (310 mg/kg)	Hydrocarbon Waste
NA	Liquid and Sludge from the UC-3 Septic Tank	CNTA5001 CNTA5002 CNTA5003 CNTA5004	---	Sanitary
NA	UC-3 Septic Tank	CNTA5001 CNTA5002 CNTA5003 CNTA5004	---	Sanitary - closed in place
NA	UC-3 RTP Septic Tank	CNTA5015	---	Sanitary - closed in place
NA	Contaminated Soil Under the UC-3 UST	U3U101 U3U102 U3U104 U3U105	Waste Oil (10 to 79 mg/kg) Hanby Kit (200 to 300 ppm Waste Oil/Diesel)	Hydrocarbon Waste - based on results of Hanby Kit analyses
NA	Contaminated Soil Under the UC-3 UST	U3U201 U3U202 U3U203 U3U204 U3U205	Waste Oil (10 to 81 mg/kg) Hanby Kit (>300 ppm Waste Oil/Diesel)	Hydrocarbon Waste - based on results of Hanby Kit analyses

[a] Only the detected analytes which caused the waste to be characterized hydrocarbon or hazardous are listed.
[b] Borehole U3E26 includes all samples taken at intervals between 0 to 30 ft. Not all samples at each interval indicated TPH in excess of State of Nevada limits.
[c] Hanby waste contains spent solvent mixtures, associated PPE, and reactive catalyst powder/residue.
[d] NA - Not applicable

ND = nondetectable

Table D.7-5
UC-4 Waste Inventory

Drum Number	Contents	Associated Sample/Borehole Number	Detected Analytes[a]	Waste Determination
UC4001	Decontamination Rinsate	U4T001 U4T002 U4T003	--	Sanitary
UC4002	Hanby Kit Waste	U4T001 U4T002 U4T003 (All UC-4 sampling)	Process Knowledge: Carbon Tetrachloride Heptane Anhydrous Aluminum Chloride	Hazardous Waste[b] (D003, D019, F001, D001)
	Sampling PPE[c]		--	Sanitary

[a] Only the detected analytes which caused the waste to be characterized hydrocarbon or hazardous are listed.
[b] Hanby waste contains spent solvent mixtures, associated PPE, and reactive catalyst powder/residue.
[c] Due to the limited sampling at the UC-4 location, sampling PPE was placed into the same drum as the field test kit waste for storage. The sampling PPE is contained in a closed plastic bag within the drum and may be easily separated from the hazardous waste in the drum.

D.8.0 References

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